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KY 196
VHF COMM TRANSCEIVER
MAINTENANCE/OVERHAUL MANUAL

King Silver Crown

5169

Sections I, II, and III have been deleted from the Maintenance-Overhaul Manual format. The Installation Manual, which covers the same information, should be placed behind this tab to complete your technical library for each unit. It is recommended that the entire Installation Manual be removed and replaced when a revision is issued. The revision number and date of revision are printed on each Installation Manual cover page.

inter-city
MFG. CO., INC.
ST. LOUIS, MO. 63111

KING®

KY 196/196E/197/197E
VHF/COMM TRANSCEIVER

INSTALLATION MANUAL
006-0169-00

REVISION 0 MARCH, 1978

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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical characteristics of the King Radio Corporation Silver Crown KY 196/196E/197/197E 720 channel VHF communications transceivers. Installation and operating procedures are also included. Information relative to the maintenance, alignment, and procurement of replacement parts may be found in KY 196/196E/197/197E maintenance/overhaul manual, King part number 006-5169-00.

The units covered are as follows:

KY 196	064-1019-00 (27.5VDC)
KY 196E	064-1019-01 (27.5VDC)
KY 197	064-1021-00 (13.75VDC)
KY 197E	064-1021-01 (13.75VDC)

1.2 EQUIPMENT DESCRIPTION

The KY 196/196E/197/197E transceiver is a TSO'd 720 channel communications transceiver and is designed to provide two-way voice communication within the frequency range of 118.000MHz to 135.975MHz in 25KHz increments.

The KY 196/196E/197/197E is a panel mounted unit. Connections to the unit are made through a 20 pin Molex printed circuit board edge connector and a BNC coax connector at the rear of the unit.

Electrically, the KY 196/196E/197/197E consists of four sections: receiver, transmitter, frequency synthesizer, and gas-discharge display circuitry. The only difference between the KY 196/197 and KY 196E/197E lies in their selectivity specifications (see Section 1.3). The only difference between the KY 196/196E and KY 197/197E is their rated transmitter power output and power requirements (see Section 1.3).

1.3 TECHNICAL CHARACTERISTICS

KY 196/196E/197/197E TRANSCEIVER TECHNICAL CHARACTERISTICS

SPECIFICATION	CHARACTERISTIC
TSO COMPLIANCE:	
Transmit:	KY 196/196E C37b (DO-157, class 3) KY 197/197E C37b (DO-157, class 4)
Receive:	KY 196/197 C38b (DO-156, Class C and D) KY 196E/197E C38b (DO-156, Class A and B) DO-160 Env. Cat./A1D1/A/KPS/XXXXXXZBAAA
APPLICABLE DOCUMENTS:	RTCA DO-156, DO-157, DO-160
WEIGHT:	3.2 lbs. (1.45Kgm)
PHYSICAL DIMENSIONS:	Width: 6.25 inches (15.88 cm) Height: 1.3 inches (3.30 cm) Depth: 10.5 inches (26.67 cm)

KY 196/196E/197/197E TRANSCEIVER TECHNICAL CHARACTERISTICS

SPECIFICATION	CHARACTERISTIC
MOUNTING:	Panel mounted, no shock mounting required
TEMPERATURE RANGE:	-20°C to +55°C with short time operation at +70°C.
POWER REQUIREMENTS:	KY 196/196E: (27.5V) Receive - .4AMP Transmit - 5.0AMP KY 197/197E: (13.75V) Receive - .8AMP Transmit - 6.0AMP
DESIGN:	All solid state. Printed circuit board and point to point wiring.
FREQUENCY RANGE:	118.000MHz to 135.975MHz in 25KHz increments
FREQUENCY STABILITY:	0.0015% to meet DO-156 Class C and D
TRANSMITTER	
POWER OUTPUT:	KY 196/196E - 16 watts minimum KY 197/197E - 10 watts minimum
MODULATION:	85% modulation capability with 90% limiting, less than 15% distortion at 85% modulation.
SIDETONE OUTPUT:	Adjustable up to 100mw into 500 ohm headphones.
MICROPHONE:	Standard carbon or dynamic mike containing transistorized pre-amp. (Must provide 100mv RMS into 100 ohm load).
HARMONIC CONTENT:	Greater than 60dB down from carrier.
HIGH-TEMPERATURE PROTECTION:	If the transmitter or modulator circuits become hot enough to potentially hurt any components in the transceiver, a protection circuit will automatically turn down the transmitter power consumption and output power (4 watts minimum).
DUTY CYCLE:	1 Min. ON, 4 Min. OFF
RECEIVER	
RECEIVER SENSITIVITY:	2uv (hard) or less for 6dB s+n/n with 1KHz tone modulated 30%.
RECEIVER SELECTIVITY:	KY 196/197 6dB at ±8KHz minimum DO-156 Class C & D 40dB at ±17KHz maximum 60dB at ±22KHz maximum KY 196E/197E 6dB at ±15KHz minimum DO-156 Class A & B 60dB at ±43KHz maximum

KY 196/196E/197/197E TRANSCEIVER TECHNICAL CHARACTERISTICS

RECEIVER	
SPECIFICATION	CHARACTERISTIC
RECEIVER OUTPUT:	100mw into 500 ohms minimum
AGC CHARACTERISTICS:	From 5uv to 20,000uv audio output will not vary more than 3dB.
SQUELCH:	Automatic squelch (internally adjustable carrier-to-noise setting) with manual disable and carrier squelch override. Both squelch adjustments are externally accessible.
SPURIOUS RESPONSES AND CROSS MODULATION PRODUCTS:	At least 80dB down
INTERCOM INPUT:	The mike is connected to the intercom input. The receiver is operational and mike audio appears at the audio output along with receive audio. 100mv RMS of mike audio into 100 ohm load is required for 100mw output.

1.4 UNITS AND ACCESSORIES SUPPLIED

A. King KY 196/196E/197/197E Transceiver with mounting rack

B. King KY 196/196E/197/197E Installation Kit (KPN 050-1704-00)

PART NUMBER	DESCRIPTION	QUANTITY
030-0101-02	Conn BNC	1
030-1094-55	Conn Molex (20 Pin)	1
030-1107-21	Conn Pin (21)	1
089-2353-01	Clip Nut 6-32	6
089-5903-06	Screw PHP (4-40x3/8)	1
089-5903-07	Screw PHP (4-40x7/16)	2
089-6012-08	Screw FHP (6-32x1/2)	6
089-8094-22	Flat Washer	1
090-0019-07	Retaining Ring	1
091-0072-02	Cable Clamp	1

1.5 ACCESSORIES REQUIRED, BUT NOT SUPPLIED

A. Communications Antenna and Cables

B. Headphones: (500 ohms nominal impedance)

C. Microphone: Low impedance carbon or dynamic with transistorized pre-amp

D. For 13.75 volt operation of the KY 196/196E a 14 to 28 volt DC to DC converter such as the KGS Electronics Model RB-125 or equivalent may be used.

1.6 LICENSE REQUIREMENTS

The Federal Communications Commission requires that the operator of the transmitter of this equipment hold a Restricted Radio Telephone Operator Permit (FCC Form 753) or higher class license. A permit may be obtained by a U.S. citizen from the nearest field office of the FCC; no examination is required.

This equipment has been type accepted by the FCC and entered on their list of type accepted equipments as King KY 196, KY 196E, KY 197 or KY 197E and must be identified as King KY 196, KY 196E, KY 197 or KY 197E.

CAUTION

THE VHF TRANSMITTER IN THIS EQUIPMENT IS GUARANTEED TO MEET FEDERAL COMMUNICATIONS COMMISSION ACCEPTANCE OVER THE OPERATING TEMPERATURE RANGE ONLY WHEN A KING CRYSTAL IS USED IN THE STABILIZED MASTER OSCILLATOR.

USE OF OTHER THAN A KING CRYSTAL IS CONSIDERED AN UNAUTHORIZED MODIFICATION, AND WILL VOID THE WARRANTY.

An Aircraft Station License is required for this equipment. Forms (FCC Form 404, New Aircraft Station License, or FCC Form 405A, Renewal of Aircraft Station License) can be obtained from your nearest FCC Field Office.

SECTION II
INSTALLATION

2.1 GENERAL

This section contains suggestions and factors to consider before installing the KY 196/196E/197/197E. Close adherence to these suggestions will assure a more satisfactory performance from the equipment.

2.2 UNPACKING AND INSPECTING EQUIPMENT

Exercise extreme care when unpacking the unit. Make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim. When all equipment is removed, place in the shipping container, all packing materials for use in unit storage or reshipment.

2.3 INSTALLATION

The KY 196/196E/197/197E installation will conform to standards designated by the customer, installing agency and existing conditions as to the unit location and type of installation. However, the following suggestions should be considered before installing your KY 196/196E/197/197E. The installing agency will supply and fabricate all external cables. The connectors required are supplied by King Radio. Interconnect diagrams are Figures 2-6A through 2-H.

NOTE

USE GOOD QUALITY STRANDED WIRE WITH AT LEAST 600 VOLT INSULATION THAT WILL NOT SUPPORT A FLAME.

2.3.1 MOUNTING RACK INSTALLATION

A. The KY 196/196E/197/197E is mounted rigidly in the aircraft panel. Select a position in the panel that is not too close to any high external heat source. Remember to allow adequate space for installation of cables and connectors. Avoid sharp bends and placing the cables too near the aircraft control cables.

B. Refer to Figure 2-4 for the KY 196/196E/197/197E mounting dimensions. Mark and cut the mounting holes.

C. Secure the mounting rack to the instrument panel per Figure 2-4. The rear mounting bosses should be attached to the airframe by means of support brackets.

2.3.2 ANTENNA INSTALLATION

A. A conventional 50 ohm vertically polarized COMM antenna is required with the KY 196/196E/197/197E. Vertical bent whip antennas are not recommended. Wideband COMM antennas provide efficient operation over the COMM band. Antennas should be installed per manufacturer's recommendations. Additional recommendations are as follows.

B. Mount antenna on a flat metal surface or install a ground plane at least 18 inches square.

C. The antenna should be well removed from any projections and the engine(s) and propeller(s). Also, for satisfactory operation, the antenna isolation between a communications transmitter antenna and a NAV receiver antenna, as well as between dual COMM antennas, should be a minimum of 30dB. VHF antennas mounted on top and bottom have approximately 30dB isolation. A horizontally polarized NAV antenna and a vertical polarized COMM antenna will have practical values from 10 to 30dB.

2.3.3 CABLE HARNESS AND CONNECTOR ASSEMBLY

The KY 196/196E/197/197E uses a special connector that mates directly with the printed circuit board inside the unit. Assembly of the connector is as follows:

A. Contact Terminal Assembly using Molex Crimper (Figure 2-1)

1. Strip each wire 5/32" for contact terminal (KPN 030-1107-XX). (The last two digits of the contact terminal part number indicates the number of terminals required).

2. Open the Molex hand crimper HT 1921 with the engraved side toward the operator. Place the conductor tab section of a contact terminal on Anvil B with the contact portion facing away from the operator. Close the crimper slightly until the contact tabs touch the female jaw.

3. Insert the stripped conductor until the insulation is even with the side of the crimper facing the operator. Crimp the conductor tabs by squeezing the handles together until the jaws are fully closed or a sufficient crimp is obtained.

4. Move the lead to Anvil A. Place the insulating tab section on Anvil A. Crimp again until the jaws are fully closed or a sufficient crimp is obtained.

B. Contact Insertion into Molex Connector Housing

1. After the contact terminals have been installed on the wiring harness, the contact terminals can be inserted into the proper location in the connector housing (KPN 030-1094-54). The terminal cannot be inserted upside down. Be sure to push the terminal all the way in, until a click can be felt or heard.

2. The self locking feature can be tested by gently pulling on the wire.

C. Location of Polarizing Key in Housing

1. Prior to insertion of connector into rear of unit, check polarizing key position between contacts 3 and 4.

2. Refer to Figure 2-5 to check correct position of polarizing key.

D. Extraction of Contact from Molex Connector

1. Slip the flat narrow blade of a Molex contact ejector tool, HT-1884 (KPN 005-2012-11), under the contact on the mating side of the connector. By turning the connector upside down one can see the blade slide into the stop.

2. When the ejector is slid into place, the retaining tab of the contact is raised, allowing the contact to be removed by pulling moderately on the lead.

3. Neither the contact or position is damaged by removing a contact; however, the contact should be checked visually before reinstalling in connector to be certain that retaining tab "A" extends as shown (see Figure 2-1) for retention in connector.

E. Coax Connector

Refer to Figure 2-3 for the details for mounting the right angle coaxial BNC connector to the coax cable. Install the connector into the mounting rack.

2.3.4 KY 196/196E/197/197E INSTALLATION

A. Looking at the top of the unit, make sure the front lobe of the holddown device is in a vertical position.

B. Slide the unit into the mounting rack until the front lobe touches the mounting rack.

C. Insert a 3/32" Allen wrench through a hold in the front panel to engage the locking screw. Turn clockwise until the rear lobe engages the mounting rack. Continue turning until the unit is secure in the mounting rack. Do not overtighten.

D. For removal, turn the locking screw counterclockwise, using a 3/32" Allen wrench, until the unit disengages from the mounting rack. Pull the unit out of the mounting rack by pulling on the metal tabs located behind the front panel on each side of the unit. Radio Extractor KPN 071-6045-00 is designed to aid in the removal of this and other King products (See Figure 2-2).

2.4 POST INSTALLATION CHECK

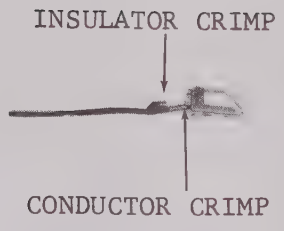
An operation performance flight test is recommended after the installation is completed to insure satisfactory performance of the equipment in its normal environment. Check all aircraft control movements to be sure no electrical cables interfere with their operation. To check the communications transceiver, maintain an appropriate altitude and contact a ground station facility at a range of at least fifty nautical miles. Contact a ground station close in. Pull the volume control knob out to defeat the automatic squelch feature and listen for any unusual electrical noise which would reduce the COMM receiver sensitivity by increasing the squelch threshold. If possible, verify the communications capability on both the high and low end of the VHF COMM band.

NOTE

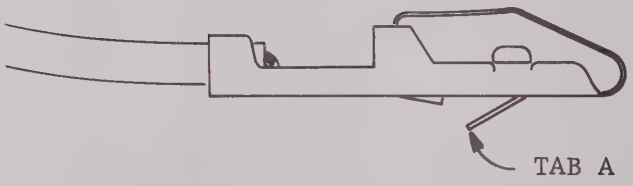
As an added precaution before the flight, check the antenna. VSWR should be checked with an in-line type wattmeter inserted in the coaxial transmission line between the transceiver and the antenna. Any problem with the antenna installation will most likely be seen as a high reflected power. A VSWR of 3:1 will result in a 25% loss in power.

NOTE

The brightness of the display can be set for the most pleasing intensity by adjusting R130 during low light level conditions. R130 is accessible through the bottom of the radio when it is partially pulled out of the rack.



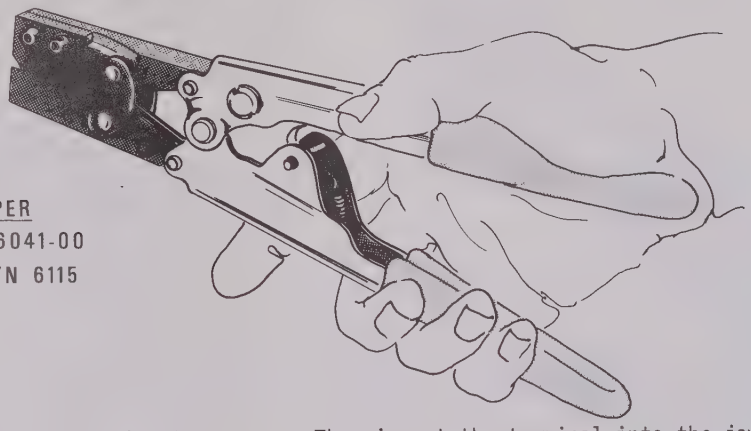
SOLDERLESS CONTACT TERMINAL
KPN 030-1107-30



HAND EJECTOR
KPN 005-2012-11
MOLEX PN HT-1884

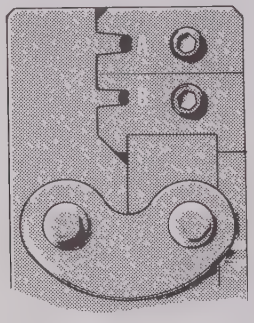
FIGURE 2-1 MOLEX TERMINAL AND TOOLS
(Sheet 1 of 3)

Holding the hand crimpers as shown, release the crimper's ratchet pawl and open by squeezing tightly on the handles, and then releasing pressure.

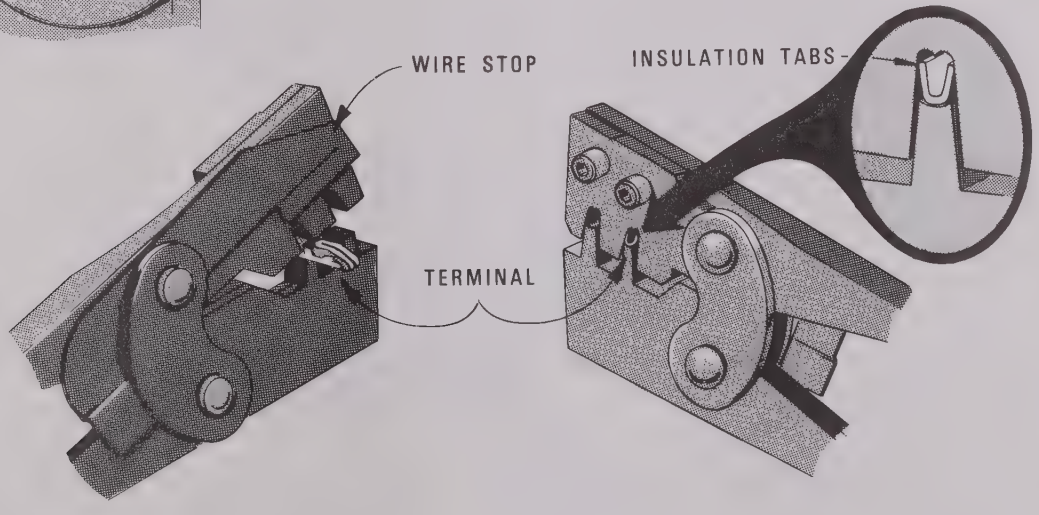


HAND CRIMPER
KPN 071-6041-00
MOLEX P/N 6115

Close crimpers until ratchet begins to engage. Then insert the terminal into the jaws from the back side. (See Figures at bottom of page) For 24 to 30AWG wire, it will be necessary to start the crimp in jaw A and then complete it in jaw B.



JAW	TERMINAL	WIRE SIZE	INSULATION RANGE
A	030-1107-30	18 to 24 AWG	.110 to .055
B	030-1107-30	24 to 30AWG	.055 to .030

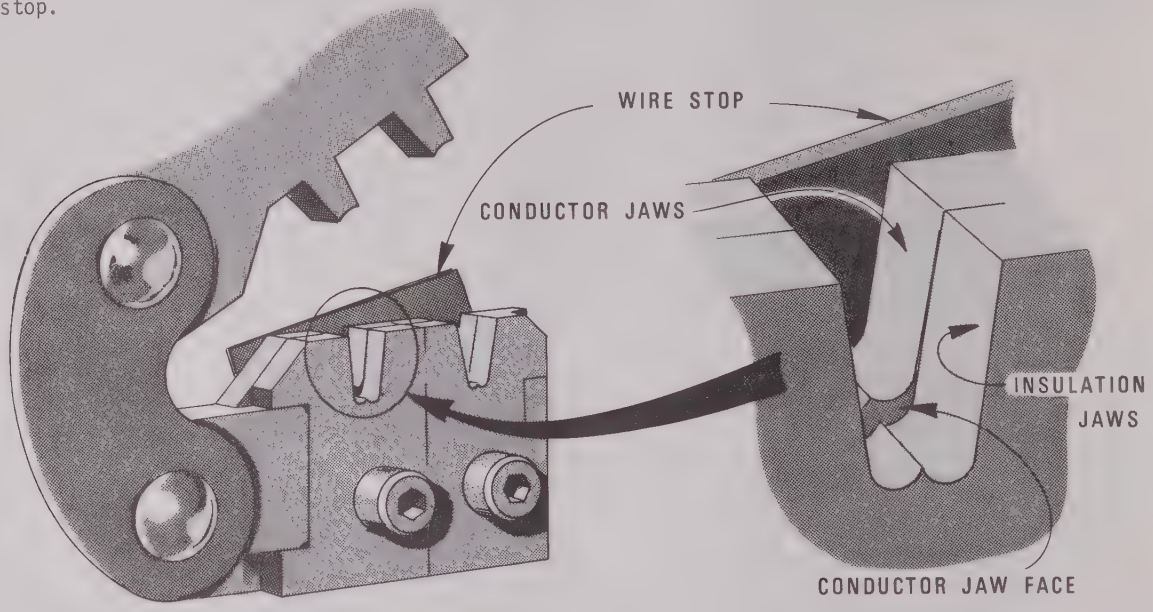


Terminal is in correct position when insulation tabs are flush with outside face of crimp jaws.

FIGURE 2-1 MOLEX TERMINAL AND TOOLS
(Sheet 2 of 3)

Once the terminal is in the correct position, close the jaws gently until the terminal is held loosely in place. Push wire stop down so that it rests snugly behind the contact portion of the terminal.

Strip the wire insulation back 1/8 inch and insert the wire through the insulation tabs into the conductor tabs until the insulation hits the conductor jaw face or until the conductor touches the wire stop.



Squeeze the handles until the crimp jaws close and the ratchet releases.

Straighten the terminal if necessary, then release the plier grips and remove the crimped terminal.

CRIMPING PRESSURE ADJUSTMENT

If too much or too little pressure is needed to release the crimper's ratchet pawl at the end of the crimp stroke, the ratchet can be easily adjusted. A spanner wrench provided with the tool can be used to loosen the lock nut, and rotate the keyed stud clockwise for increased pressure and counter-clockwise for decreased pressure. Once the desired pressure has been set, the lock nut must be tightened again. Newer models may have a screwdriver adjustment.

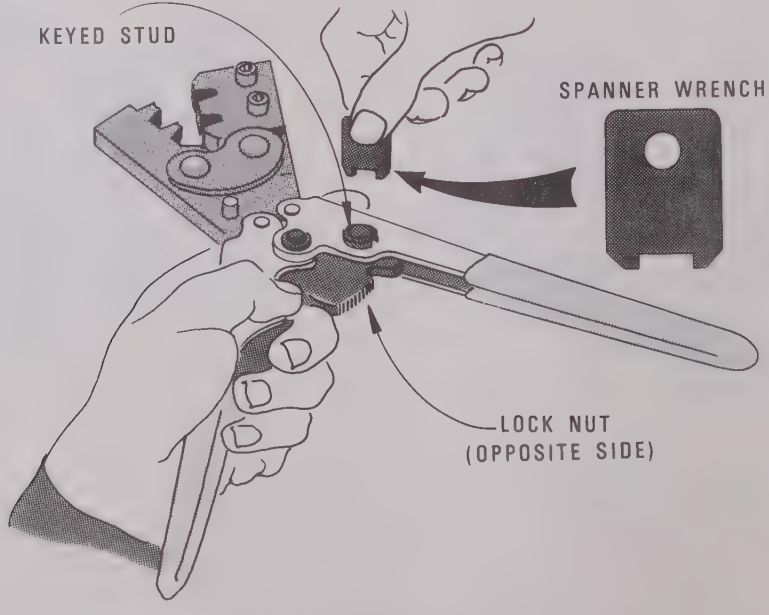
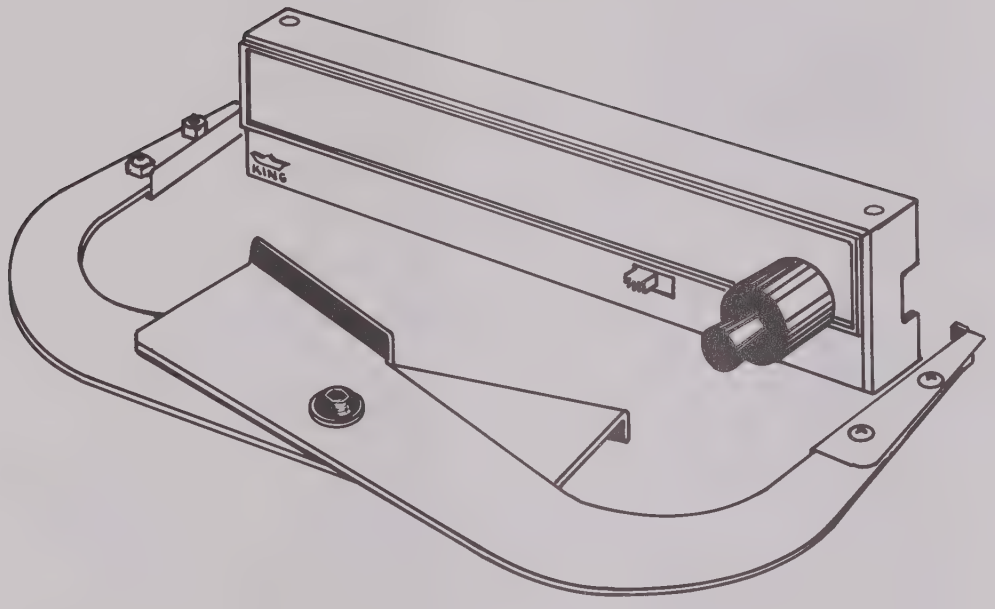


FIGURE 2-1 MOLEX TERMINAL AND TOOLS
(Sheet 3 of 3)

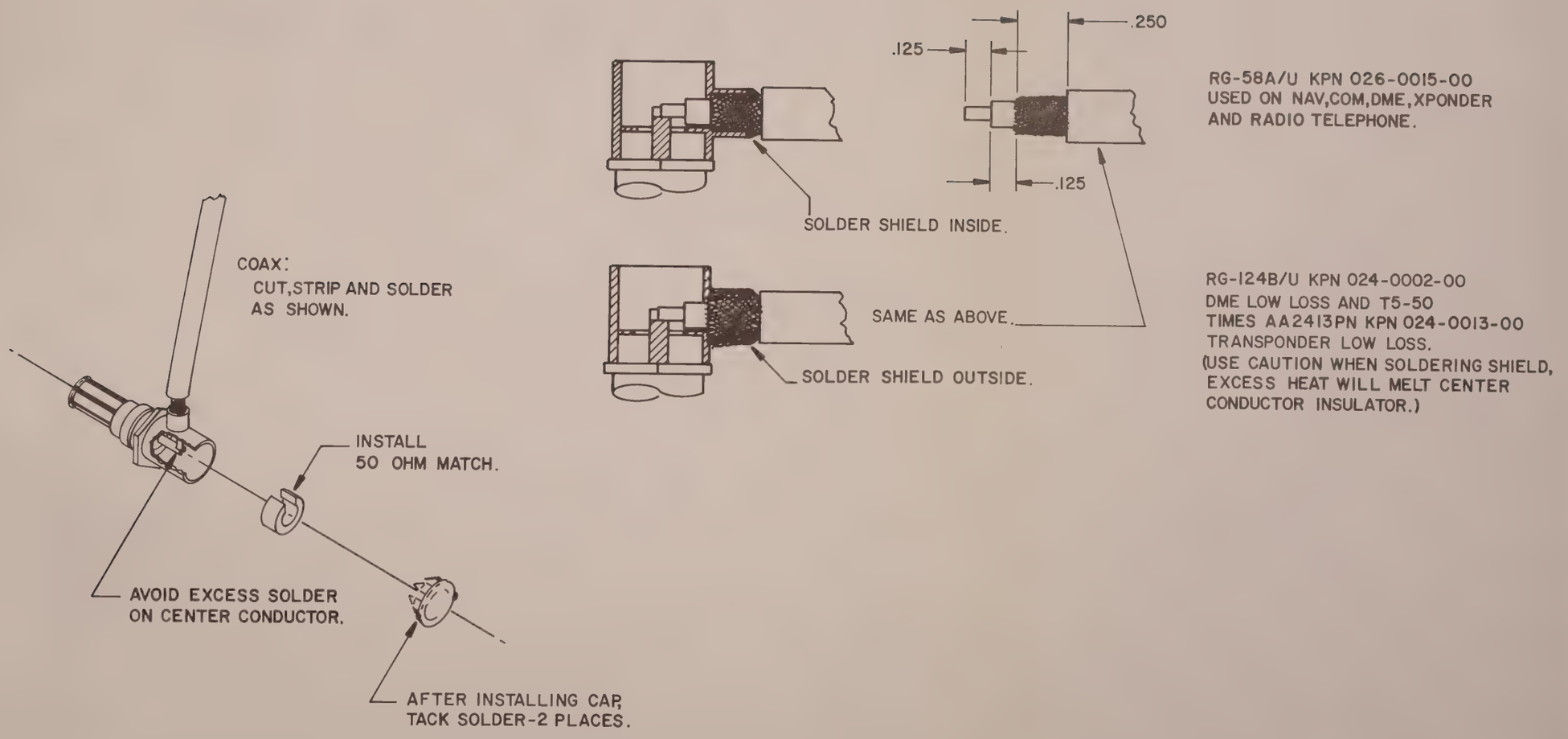


REPLACEMENT HOOKS

047-4796-00, SHORT HOOKS

047-4796-01, LONG HOOKS

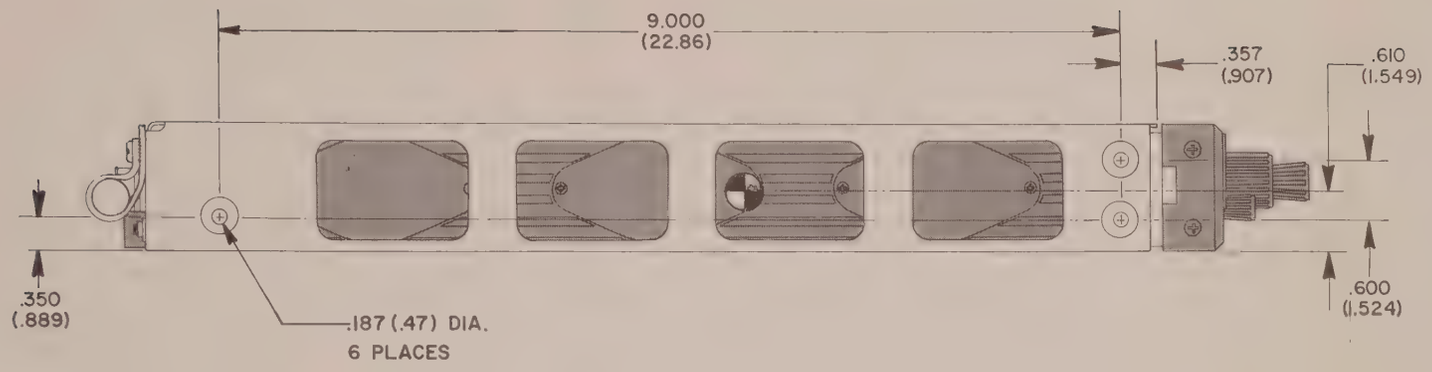
FIGURE 2-2 RADIO REMOVAL TOOL
KPN 071-6045-00

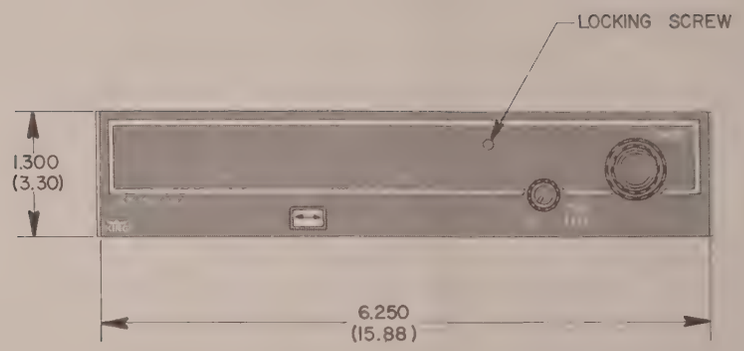


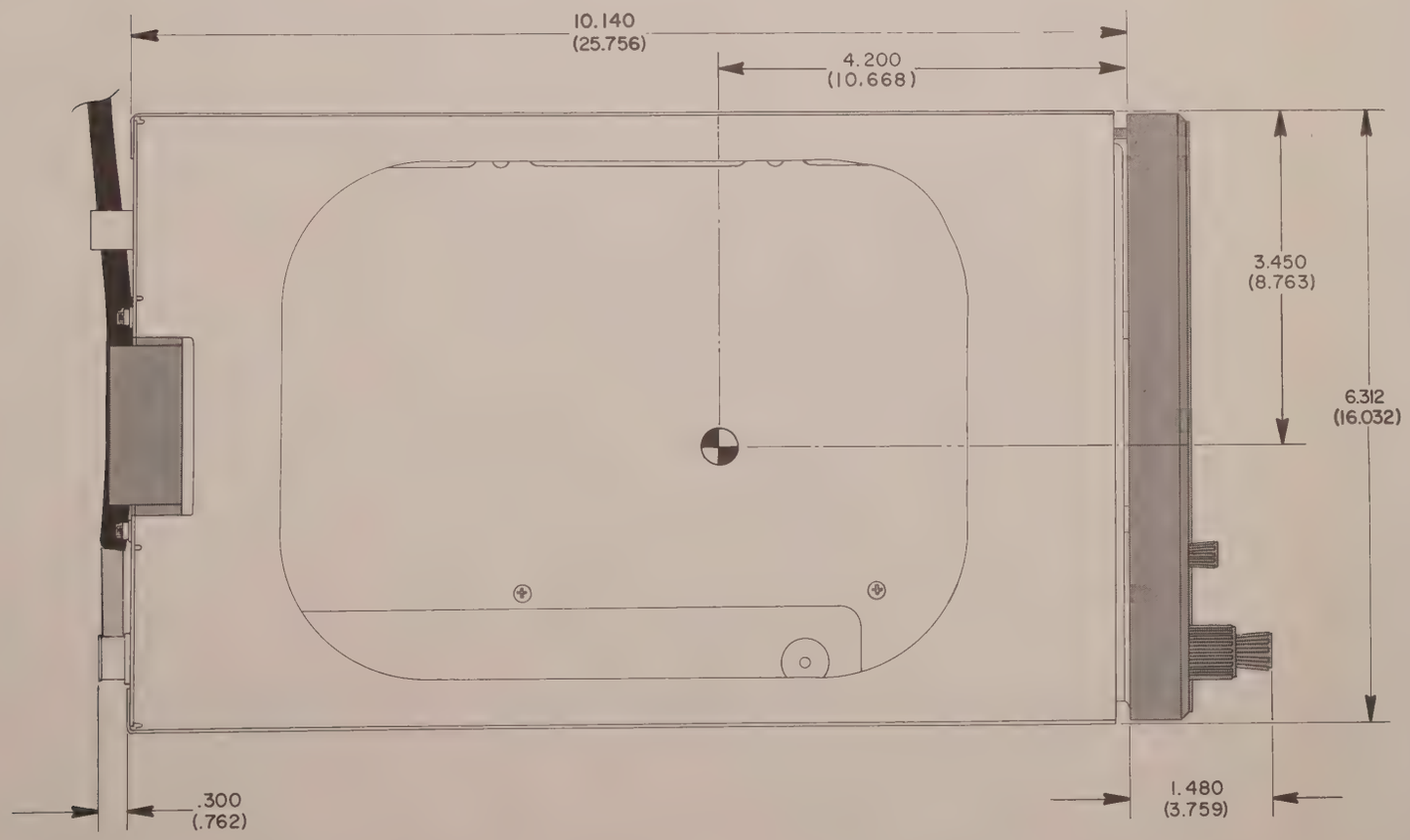
RG-58A/U KPN 026-0015-00
USED ON NAV,COM,DME,XPONDER
AND RADIO TELEPHONE.

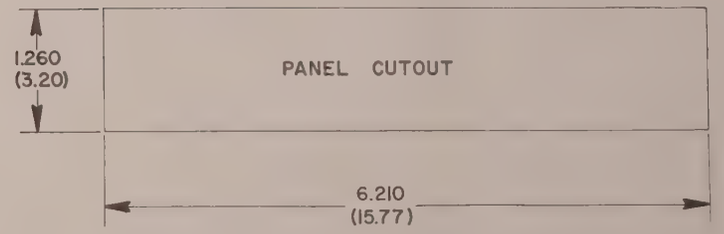
RG-124B/U KPN 024-0002-00
DME LOW LOSS AND T5-50
TIMES AA2413PN KPN 024-0013-00
TRANSPONDER LOW LOSS.
(USE CAUTION WHEN SOLDERING SHIELD,
EXCESS HEAT WILL MELT CENTER
CONDUCTOR INSULATOR.)

FIGURE 2-3 KPN 030-0101-02 CONNECTOR ASSEMBLY



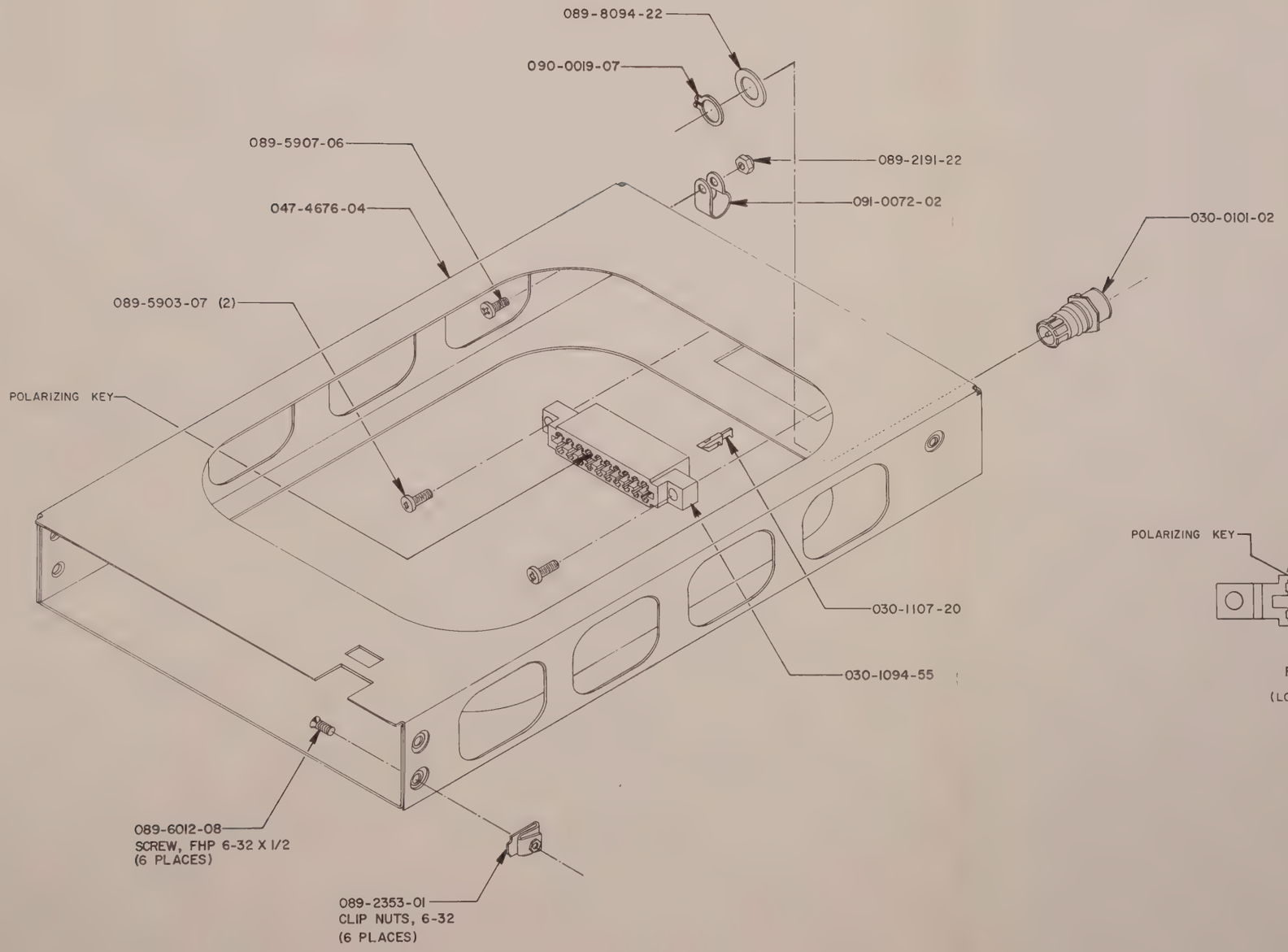


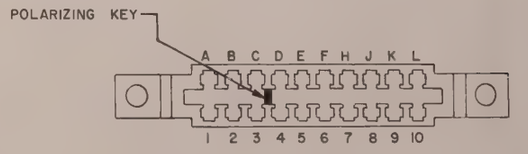




NOTES:
1. DIMENSIONS IN ( ) ARE IN CENTIMETERS.
2. WEIGHT: 3.1 LBS. (1.406 Kg).

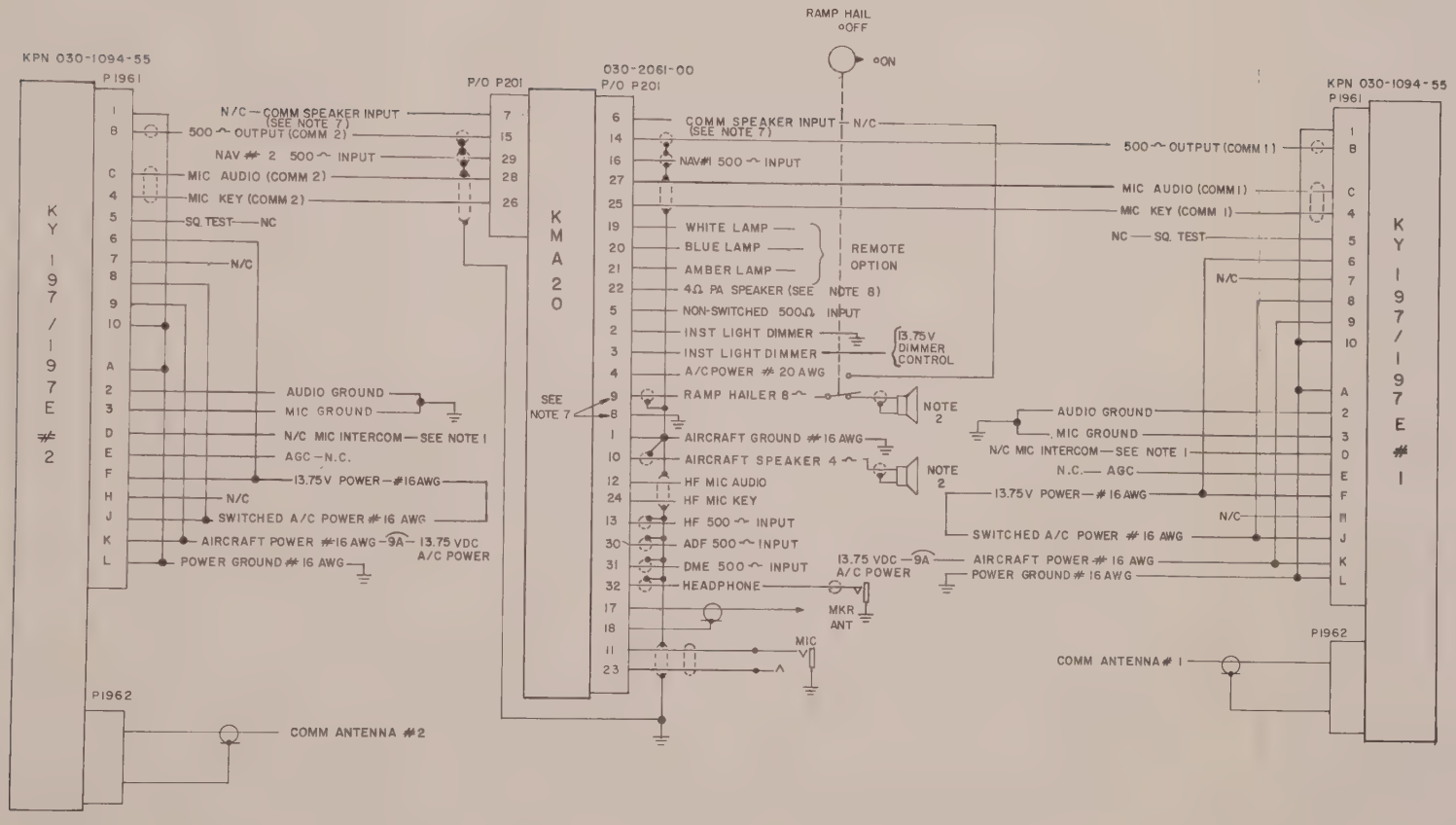
FIGURE 2-4 KY 196/196E/197/197E OUTLINE AND MOUNTING DRAWING
(Dwg. No. 155-5309-00, R-0)





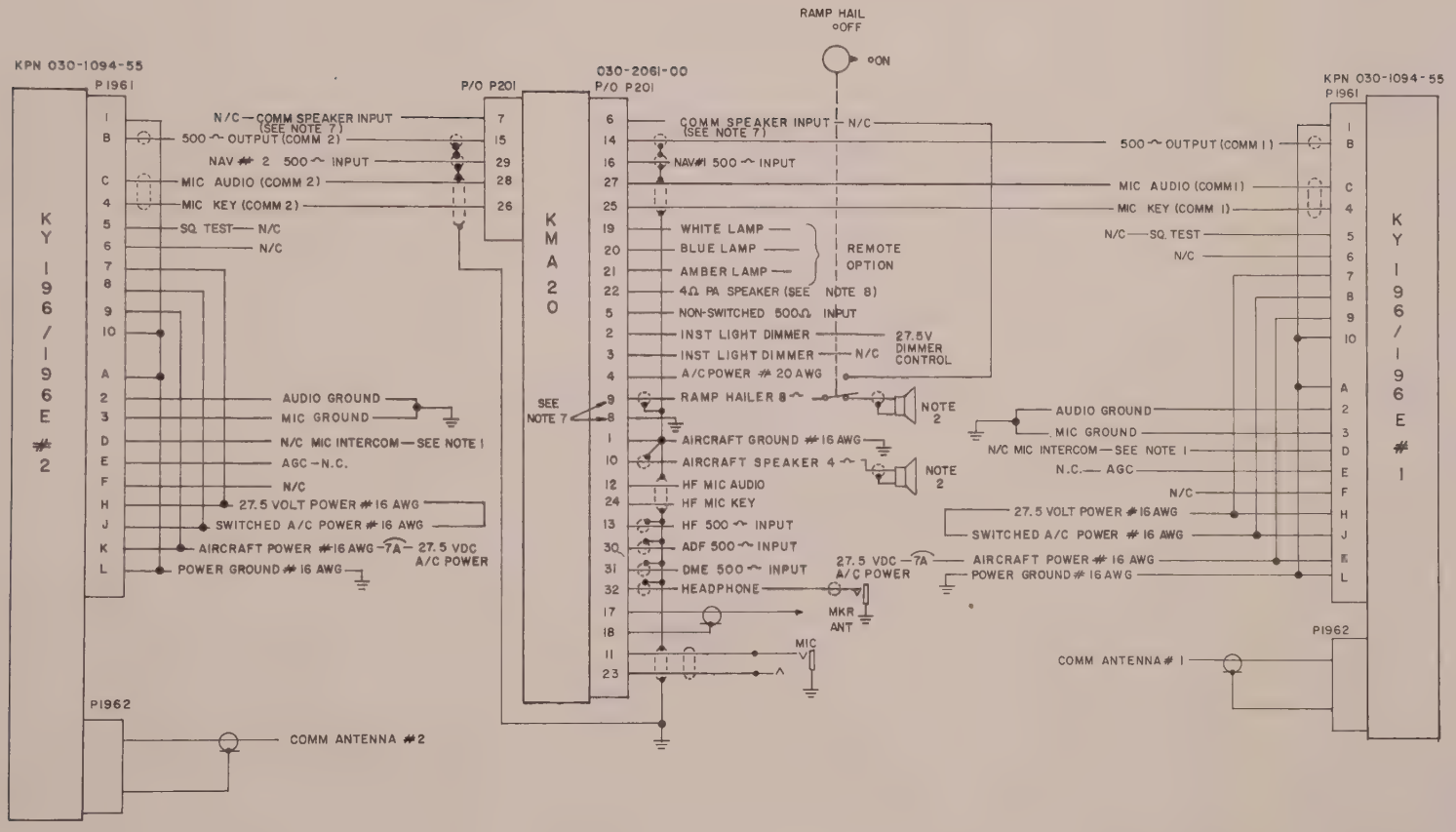
FRONT VIEW – CONNECTOR
(LOOKING IN FROM FRONT OF RACK)

FIGURE 2-5 KY 196/196E/197/197E INSTALLATION ASSEMBLY DRAWING
(Dwg. No. 155-5310-00, R-0)



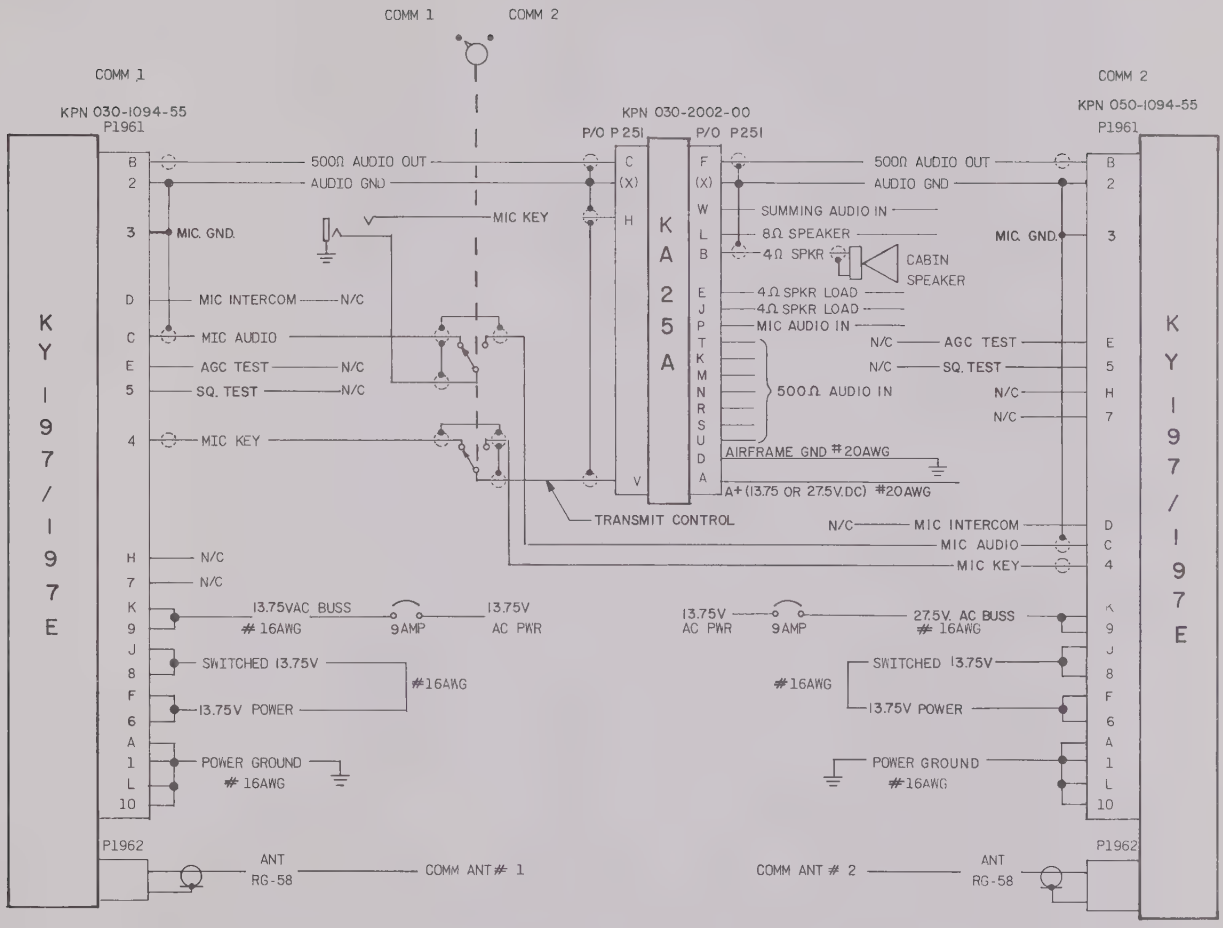
1. MIC INTERCOM IS NOT USED. INTERCOM IS PROVIDED BY USING EXT. MODE OF KMA 20 AND CONNECTING RAMPHAIL OUTPUT TO A RESISTOR LOAD.
2. RAMP HAILER AND AIRCRAFT SPEAKER SHIELDS SHOULD BE CONNECTED TO PIN 1 AT KMA 20.
3. UNLESS NOTED, ALL WIRES #24 AWG MINIMUM.
4. ALL ANTENNA COAX IS RG58 A/U.
5. UNLESS OTHERWISE SPECIFIED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
6. POWER BUSS CIRCUIT BREAKERS ARE TO BE MOUNTED IN THE AIRCRAFT BREAKER PANEL OR INSTRUMENT PANEL SUCH THAT THEY WILL BE ACCESSIBLE IN FLIGHT AND SAFE FROM PHYSICAL DAMAGE.
7. THIS INTERCONNECT DRAWING IS FOR KMA 20's S/N 11233 AND ABOVE. KMA 20's S/N 11232 AND BELOW WILL REQUIRE AN EXT. 8Ω LOAD RESISTOR FOR RAMPHAIL OUTPUT. SEE INSTALL BULLETIN # 56.
8. APPLICABLE TO KMA 20-09,-10,-11,-13 AND,-14 ONLY.

FIGURE 2-6A KY 197/197E INTERCONNECT DIAGRAM WITH KMA 20 (13.75VDC) TO PROVIDE 4 OHM SPEAKER OUTPUT, RAMP HAILER AND INTERCOM
(Dwg. No. 155-1320-00, R-0)



1. MIC INTERCOM IS NOT USED. INTERCOM IS PROVIDED BY USING EXT. MODE OF KMA 20 AND CONNECTING RAMPHAIL OUTPUT TO A RESISTOR LOAD.
2. RAMP HAILER AND AIRCRAFT SPEAKER SHIELDS SHOULD BE CONNECTED TO PIN 1 AT KMA 20.
3. UNLESS NOTED, ALL WIRES # 24 AWG MINIMUM.
4. ALL ANTENNA COAX IS RG58 A/U.
5. UNLESS OTHERWISE SPECIFIED, ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
6. POWER BUSS CIRCUIT BREAKERS ARE TO BE MOUNTED IN THE AIRCRAFT BREAKER PANEL OR INSTRUMENT PANEL SUCH THAT THEY WILL BE ACCESSIBLE IN FLIGHT AND SAFE FROM PHYSICAL DAMAGE.
7. THIS INTERCONNECT DRAWING IS FOR KMA 20's S/N 11233 AND ABOVE. KMA 20's S/N 11232 AND BELOW WILL REQUIRE AN EXT. 8Ω LOAD RESISTOR FOR RAMPHAIL OUTPUT. SEE INSTALL BULLETIN # 56.
8. APPLICABLE TO KMA 20-09,-10,-11,-13 AND,-14 ONLY.

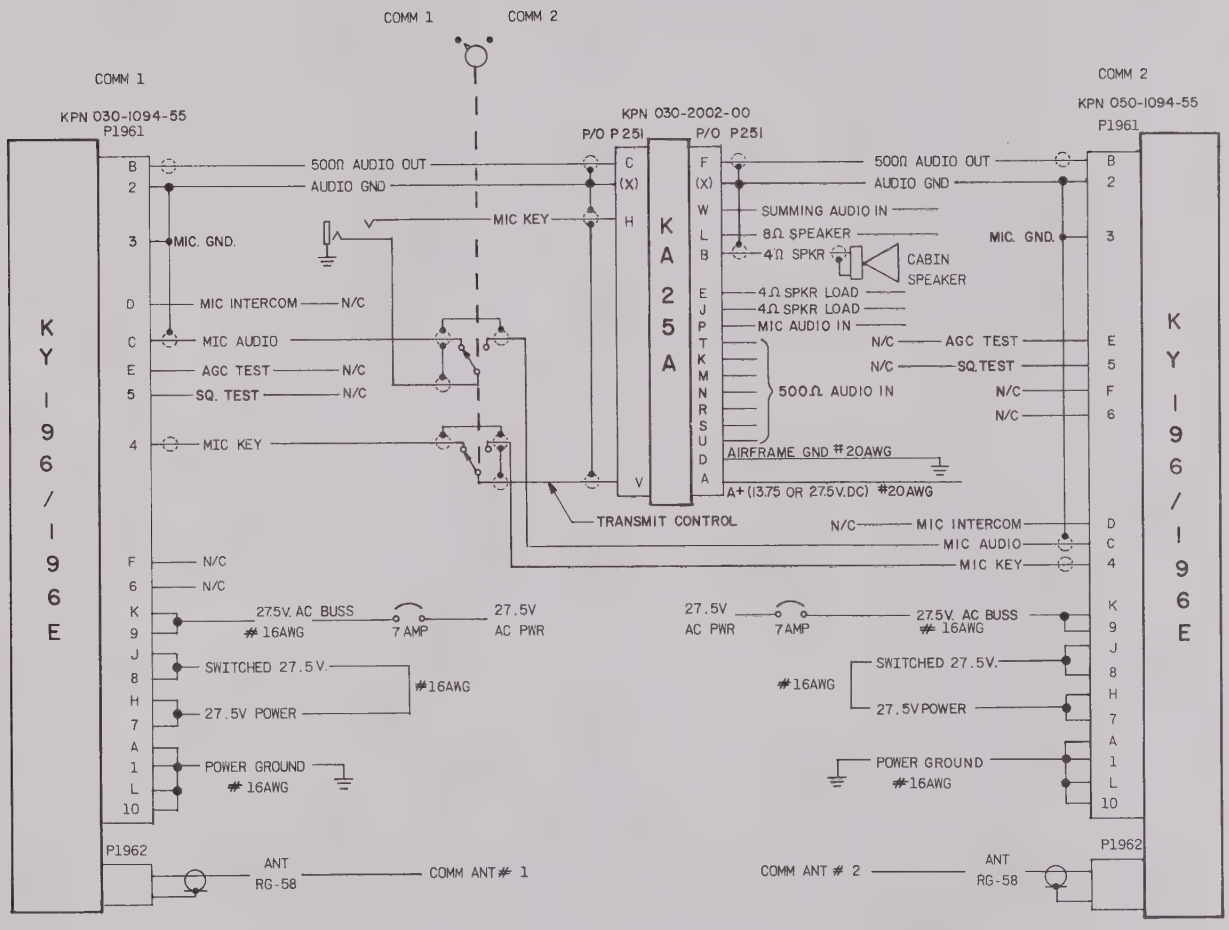
FIGURE 2-6B KY 196/196E INTERCONNECT DIAGRAM WITH KMA 20 (27.5VDC) TO PROVIDE 4 OHM SPEAKER OUTPUT, RAMP HAILER AND INTERCOM (Dwg. No. 155-1321-00, R-0)



NOTES:

1. SELECTOR SWITCH, DOUBLE POLE - DOUBLE THROW DPDT (TO BE SUPPLIED BY INSTALLER).
2. ALL WIRES #24 AWG UNLESS NOTED.
3. TERMINATE AUDIO SHIELDS AT ONE END ONLY AS SHOWN.
4. PIN # IN PARENTHESIS ARE COMMON.

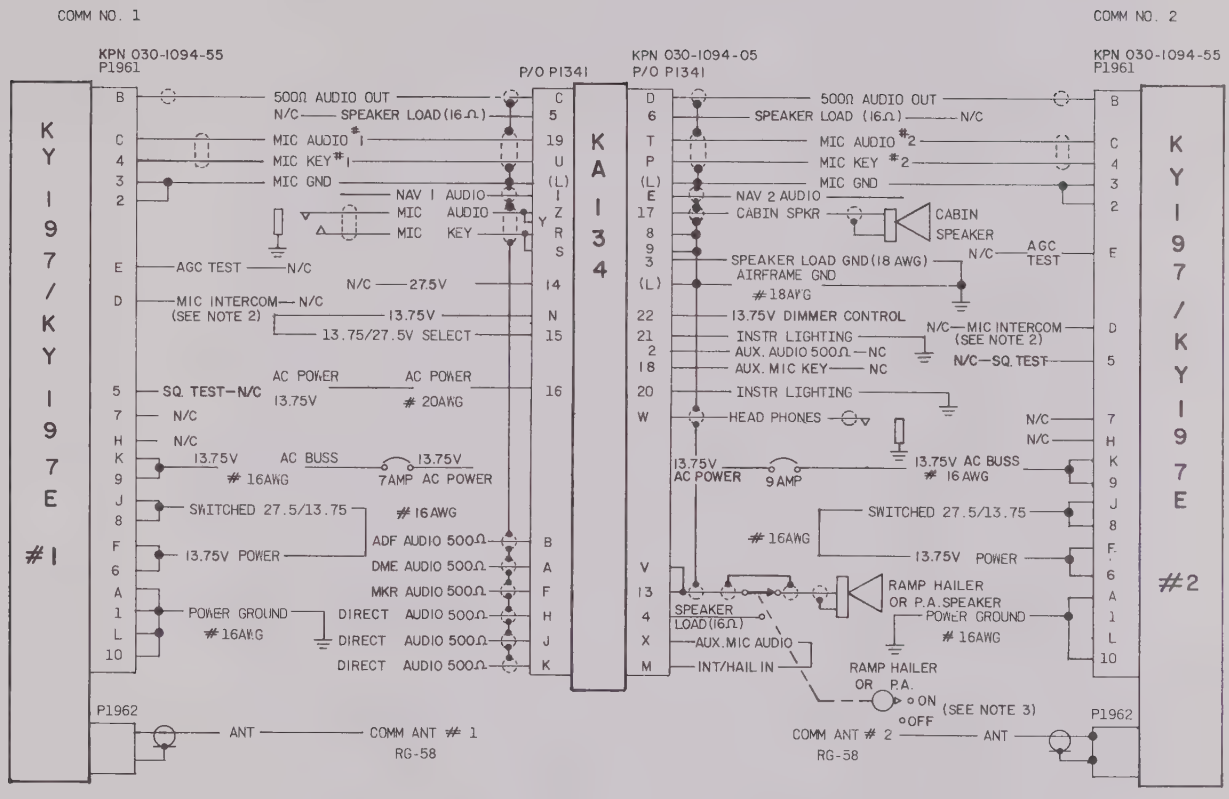
FIGURE 2-6C KY 197/197E INTERCONNECT DIAGRAM WITH KA 25A (13.75VDC)
TO PROVIDE 4 OHM SPEAKER OUTPUT
(Dwg. No. 155-1325-00, R-0)



NOTES:

1. SELECTOR SWITCH, DOUBLE POLE - DOUBLE THROW DPDT (TO BE SUPPLIED BY INSTALLER).
2. ALL WIRES #24 AWG UNLESS NOTED.
3. TERMINATE AUDIO SHIELDS AT ONE END ONLY AS SHOWN.
4. PIN #IN PARENTHESIS ARE COMMON.

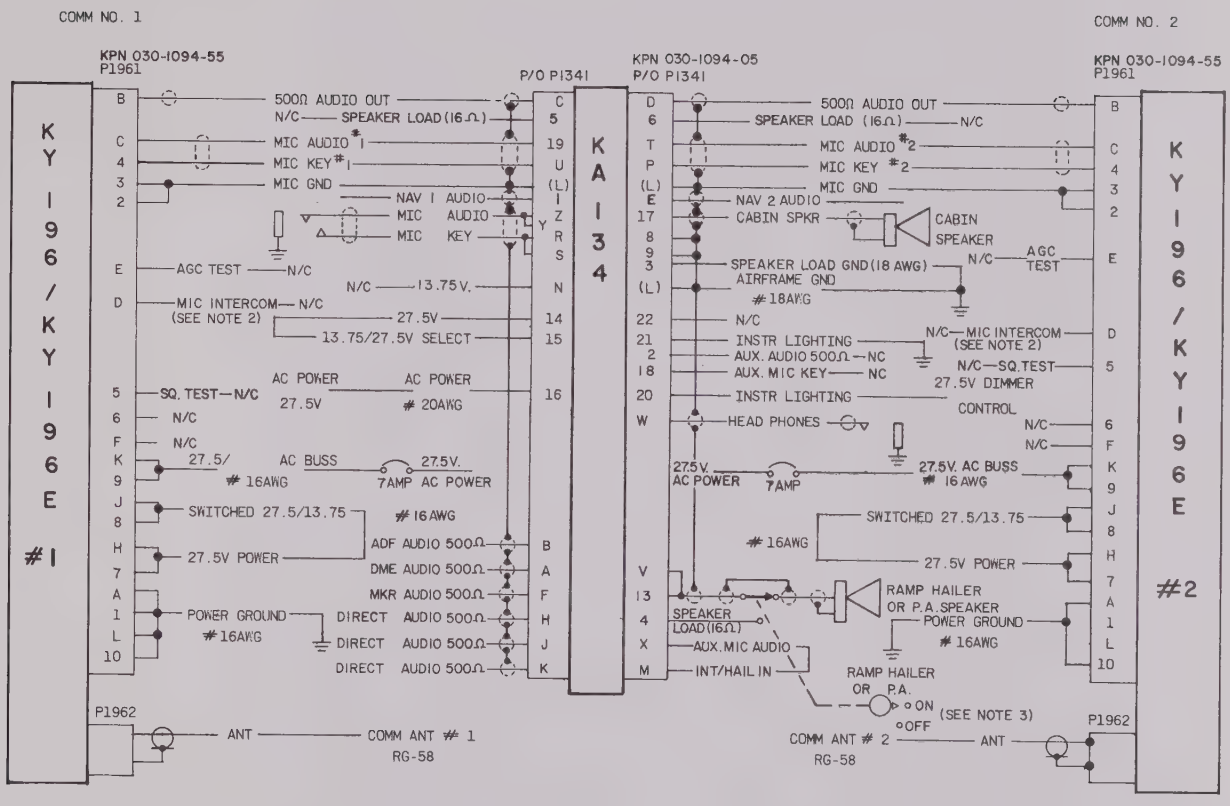
FIGURE 2-6D KY 196/196E INTERCONNECT DIAGRAM WITH KA 25A (27.5V)
TO PROVIDE 4 OHM SPEAKER OUTPUT
(Dwg. No. 155-1322-00, R-0)



NOTES:

1. ALL WIRES NO. 24AWG UNLESS NOTED.
2. MIC INTERCOM IS NOT USED. INTERCOM IS PROVIDED BY USING RAMP HAILER OR PA SIDETONE IN EXT. MODE OF KA 134
3. IF RAMP HAILER OR PA SIDETONE IS DESIRED FOR INTERCOM, RAMP HAILER OR PA SPEAKER OUTPUT PIN 13, MUST BE TERMINATED THROUGH A SWITCH TO A LOAD RESISTOR.
4. POWER BUSS CIRCUIT BREAKERS ARE TO BE MOUNTED IN THE AIRCRAFT BREAKER PANEL OR INSTRUMENT PANEL SUCH THAT THEY WILL BE ACCESSIBLE IN FLIGHT AND SAFE FROM PHYSICAL DAMAGE.
5. UNLESS OTHERWISE SPECIFIED ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
6. PIN NUMBERS IN PARENTHESES ARE ALL COMMON.

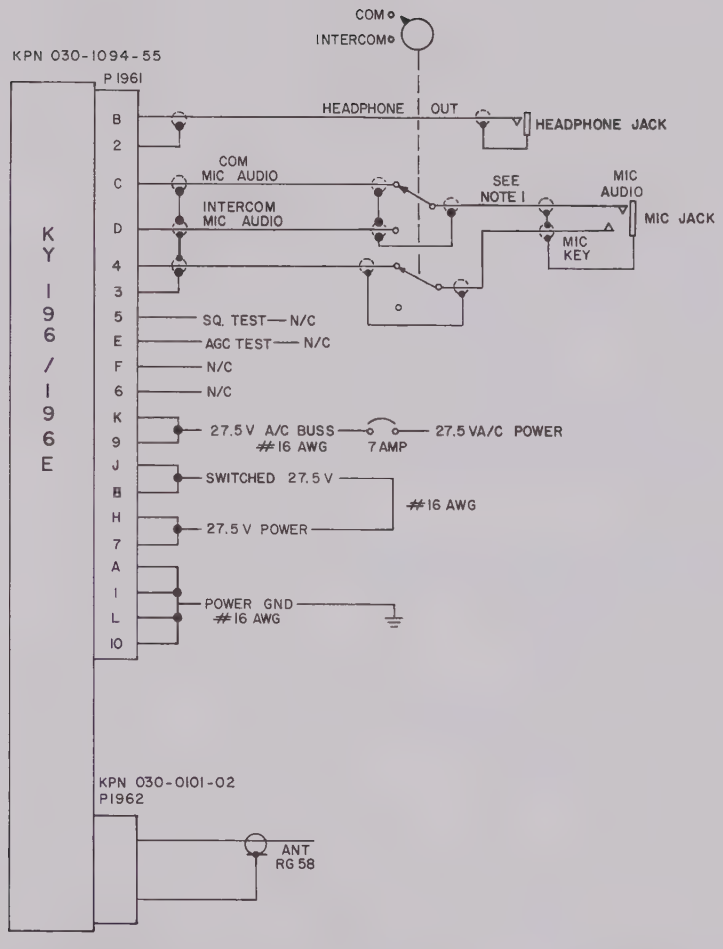
FIGURE 2-6E KY 197/197E INTERCONNECT DIAGRAM WITH KA 134 (13.75VDC)
TO PROVIDE 4 OHM SPEAKER OUTPUT, RAMP HAILER, AND INTERCOM
(Dwg. No. 155-1323-00, R-0)



NOTES:

1. ALL WIRES NO. 24AWG UNLESS NOTED.
2. MIC INTERCOM IS NOT USED. INTERCOM IS PROVIDED BY USING RAMP HAILER OR PA SIDETONE IN EXT. MODE OF KA 134.
3. IF RAMP HAILER OR PA SIDETONE IS DESIRED FOR INTERCOM, RAMP HAILER OR PA SPEAKER OUTPUT PIN 13, MUST BE TERMINATED THROUGH A SWITCH TO A LOAD RESISTOR.
4. POWER BUSS CIRCUIT BREAKERS ARE TO BE MOUNTED IN THE AIRCRAFT BREAKER PANEL OR INSTRUMENT PANEL SUCH THAT THEY WILL BE ACCESSIBLE IN FLIGHT AND SAFE FROM PHYSICAL DAMAGE.
5. UNLESS OTHERWISE SPECIFIED ALL SYSTEM GROUNDS ARE AIRFRAME GROUNDS.
6. PIN NUMBERS IN PARENTHESES ARE ALL COMMON.

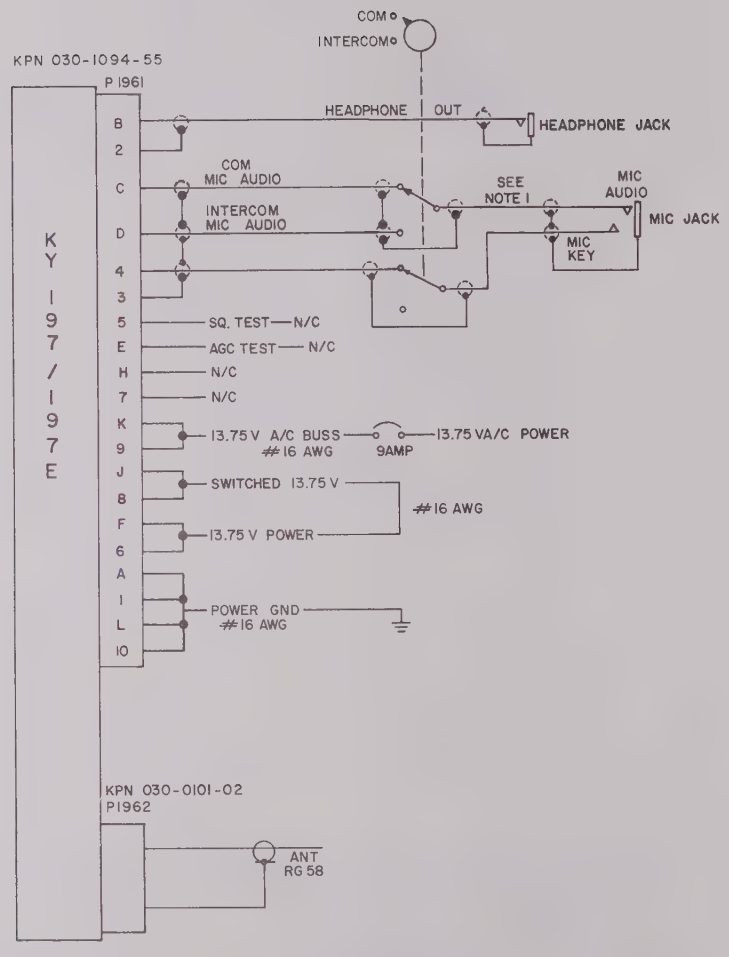
FIGURE 2-6F KY 196/196E INTERCONNECT DIAGRAM WITH KA 134 (27.5VDC)
TO PROVIDE 4 OHM SPEAKER OUTPUT, RAMP HAILER, AND INTERCOM
(Dwg. No. 155-1324-00, R-0)



NOTES:

1. INTERCOM OPERATION REQUIRES A MIKE WHICH PROVIDES AUDIO OUT WITH THE MIKE KEY DE-ENERGIZED.
2. ALL WIRES #24 AWG UNLESS NOTED.
3. TERMINATE SHIELDS AT ONE END ONLY AS SHOWN.
4. ALL GROUNDS ARE AIRFRAME GROUND UNLESS NOTED.

FIGURE 2-6H KY 196/196E INTERCONNECT TO PROVIDE INTERCOM AND HEADPHONE OUTPUT ONLY
(Dwg. No. 155-1327-00, R-0)



NOTES:

1. INTERCOM OPERATION REQUIRES A MIKE WHICH PROVIDES AUDIO OUT WITH THE MIKE KEY DE-ENERGIZED.
2. ALL WIRES #24 AWG UNLESS NOTED.
3. TERMINATE SHIELDS AT ONE END ONLY AS SHOWN.
4. ALL GROUNDS ARE AIRFRAME GROUND UNLESS NOTED.

FIGURE 2-6G KY 197/197E INTERCONNECT TO PROVIDE INTERCOM AND HEADPHONE OUTPUT ONLY
(Dwg. No. 155-1026-00, R-0)

SECTION III
OPERATION

3.1 OPERATING PROCEDURE

Rotate the "VOL" knob clockwise from the "OFF" position. Pull the "VOL" knob out to override the automatic squelch and rotate the "VOL" knob for desired listening level on the noise being produced by the receiver. Push the "VOL" knob back in to activate the automatic squelch.

Select the desired operating frequency in the standby display by rotating the increment/decrement knobs either clockwise or counterclockwise. A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency. The larger inside knob will change the MHz portion of the standby display. At one band-edge (118 or 135MHz) the following 1MHz change will wrap around to the other band edge. The smaller outside knob will change the KHz portion of the standby display. It will change in steps of 50KHz when the knob is pushed in, and 25KHz when the knob is pulled out. The wrap around bandedge is also utilized when incrementing or decrementing the KHz portion of the standby display.

To tune the radio to the desired operating frequency the desired frequency must first be entered into the standby display, and then the transfer button must be pushed. This will trade the contents of the active and standby display. The transceiver is always tuned to the frequency appearing in the active display.

It is therefore possible to have two difference frequencies stored in the use and standby displays and to change back and forth between them at the simple push of the transfer button.

During the transmit operation, a "T" will appear between the use and standby displays, signifying that the transceiver is in the transmit mode of operation.

3.2 CONTROL FUNCTIONS

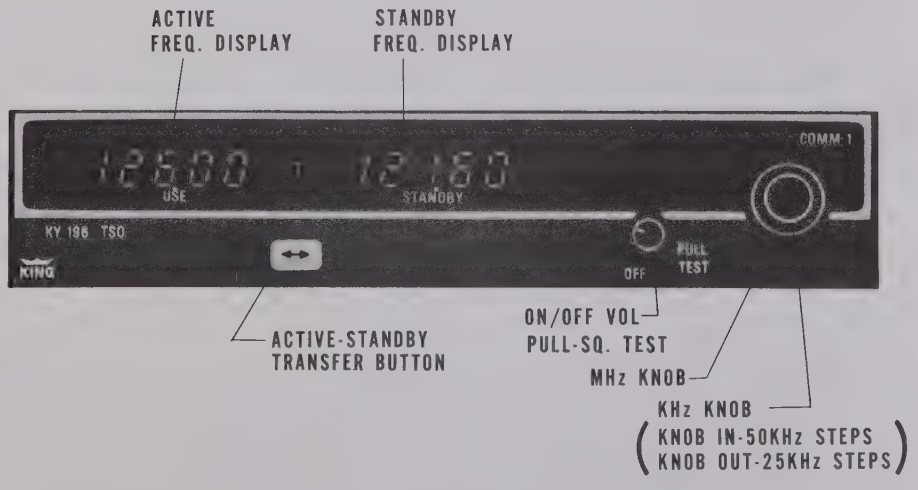


FIGURE 3-1 CONTROL FUNCTIONS

Section I, II, and III have been deleted from the Maintenance-Overhaul Manual format. The Installation Manual, which covers the same installation information, should be added behind the red Installation Manual Tab provided in this binder.

MFG. CO., INC.
ST. LOUIS, MO. 63111

MAINTENANCE/OVERHAUL MANUAL

KY 196/196E/KY 197/197E

VHF COMM TRANSCEIVER

MANUAL NUMBER	006-5169-00
REVISION NUMBER	0
DATE	MAY, 1978

KING RADIO CORPORATION®

400 NORTH ROGERS ROAD OLATHE, KANSAS, U.S.A.

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KPN 006-3001-03

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SECTION IV
THEORY OF OPERATION

4.1 GENERAL

The KY 196/KY 197 COMM transceiver is comprised of: (see Figure 4-1)

A. A single conversion VHF receiver utilizing a four pole varactor tuned preselector, field effect transistors for the RF amplifier and mixer, an 8 pole monolithic crystal IF filter and integrated circuit IF amplifier.

B. A broadband transmitter with flange mounted power transistors on a die-cast aluminum heat sink followed by a three section elliptic function low pass filter.

C. A control section utilizing a microprocessor to increment or decrement the selected frequency, store the use and standby frequencies in non-volatile memory, multiplex the display and generate frequency code, a digital readout for the active and standby frequencies with gas discharge display and automatic intensity dimming and a frequency synthesizer using low power logic.

D. A power supply made up of a high efficiency switching regulator which provides over voltage protection on the 5 volt line and current limiting.

4.2 BASIC DESIGN

4.2.1 RECEIVER

A receiver block diagram is shown in Figure 4-2. The received signal passes through the low pass filter on the transmitter PC board and the T/R diode to the dual gate field effect transistor RF amplifier. The desired signal then proceeds to the dual gate FET mixer where it is converted to 11.4MHz, and fed through the monolithic crystal filter to the integrated circuit IF amplifier followed by a bipolar transistor amplifier before being detected. Automatic gain control voltage is fed back to the first and second IF amplifiers and the RF amplifier to achieve more than 120dB of dynamic range. The detected signal is not allowed to pass through the squelch gate until the input signal has:

A. Exceeded the noise squelch setting or

B. Exceeded the carrier level setting.

It then proceeds through the low pass filter which attenuates all audio frequencies above 2.5KHz. The audio signal is then fed through the volume control to the integrated circuit audio pre-amplifier. Its output will provide more than 100 milliwatts to a headphone, or to an external audio mixer/amplifier such as the King KMA 20.

4.2.2 TRANSMITTER/MODULATOR

The transmitter block diagram is shown in Figure 4-3. In the transmit mode, the SMO feeds a signal to the transmitter of the frequency selected in the "use" display window on the front panel. The signal is amplified by the broadband transmitter to the 16 watts level (10W KY 197) and fed through the elliptic function 3 section low pass filter to the antenna.

Modulation is applied to the power amplifier by series modulating the 27.5 volt line (13.75 for KY 197) with mic audio. A small amount of mic audio is also fed to the receiver's audio amp for sidetone.

4.2.3 STABILIZED MASTER OSCILLATOR

The stabilized master oscillator (SMO) (Figure 4-4) generates the RF drive for the transmitter as well as the local oscillator for the receiver. The SMO synthesizes frequencies that are referenced to a 25KHz signal derived from a 3.2MHz crystal oscillator. Receive and transmit codes are fed to the programmable counters from the microprocessor (uP) and represent the frequency indicated in the "use" window on the front panel.

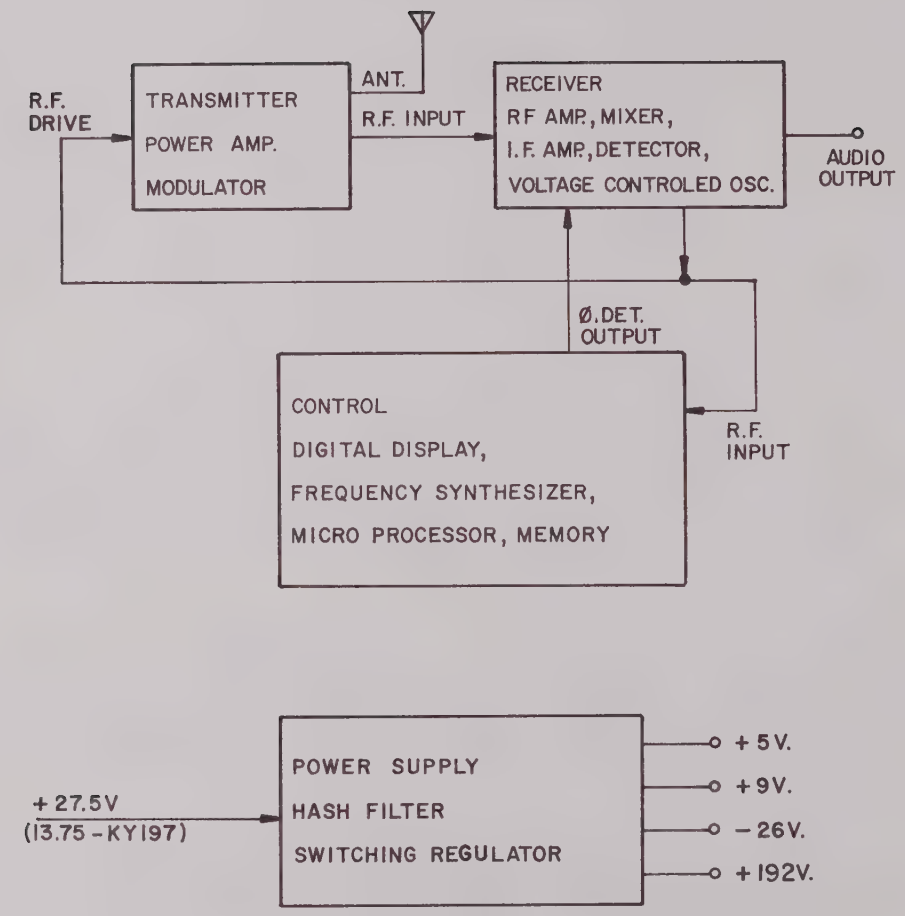

FIGURE 4-1 KY 196 COMM TRANSCEIVER

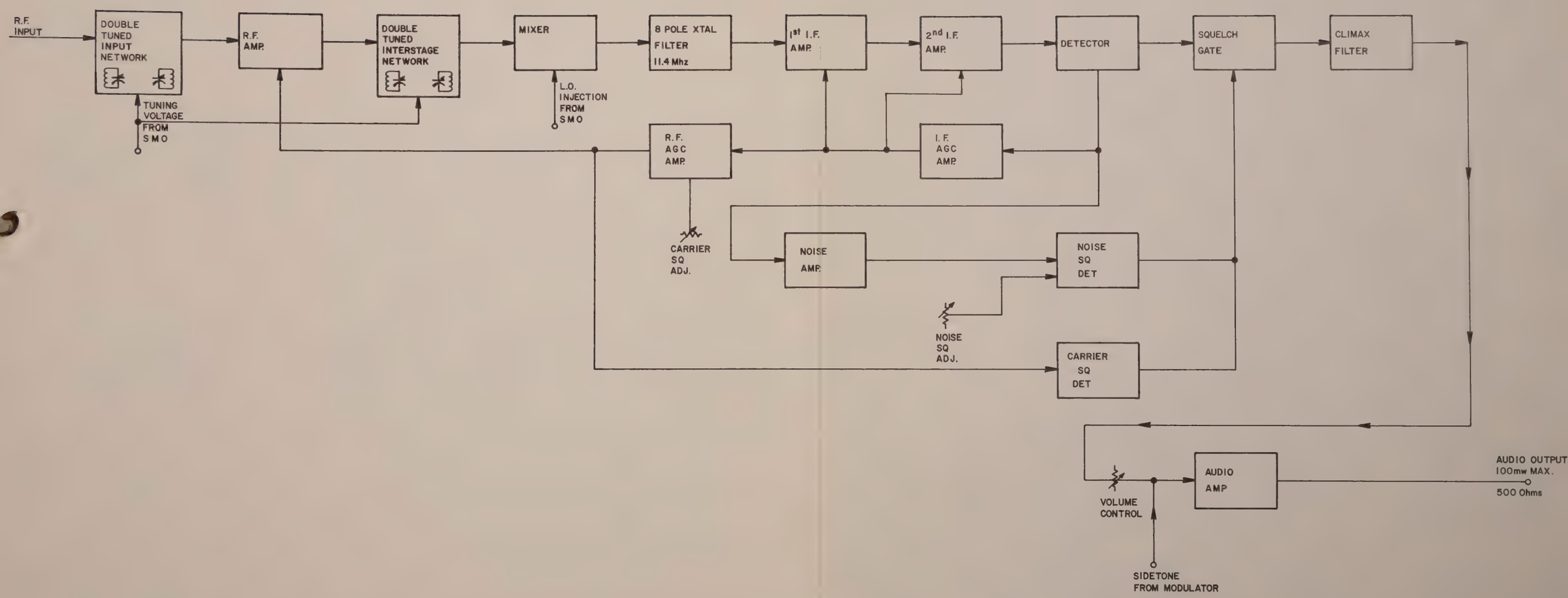

FIGURE 4-2 RECEIVER BLOCK DIAGRAM
(Dwg. No. 696-5900-00, R-0)

R.F.
INPUT

ONE STAGE OMITTED FROM
KY 197 XMTR.

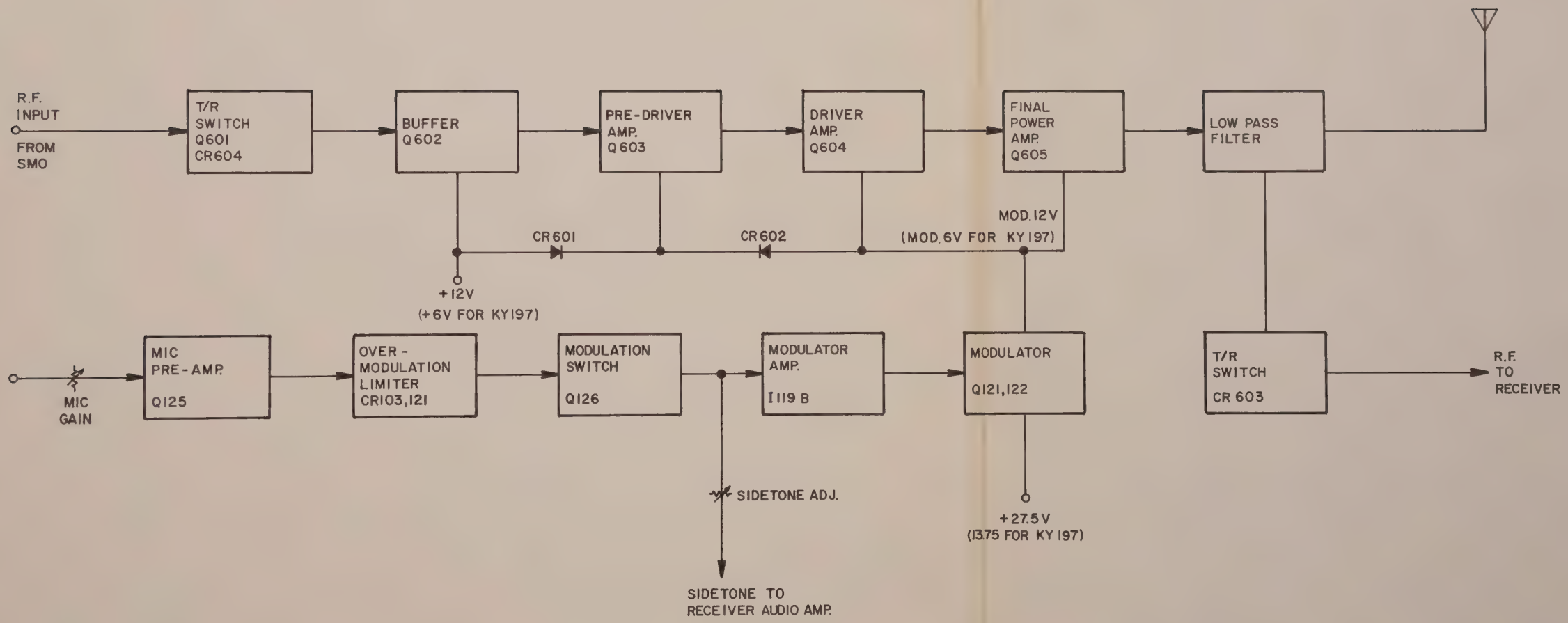

FIGURE 4-3 TRANSMITTER/MODULATOR BLOCK DIAGRAM
(Dwg. No. 696-5901-00, R-0)

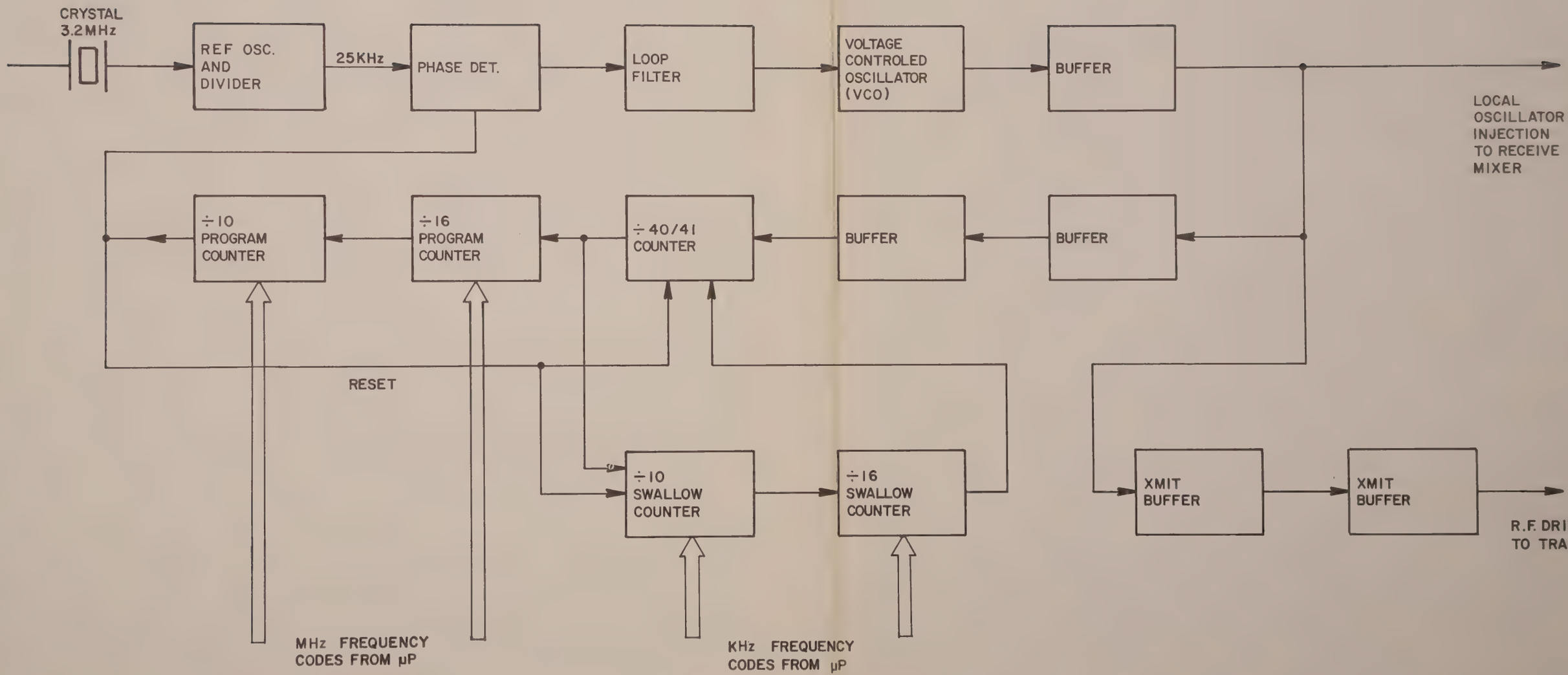

FIGURE 4-4 STABILIZED MASTER OSCILLATOR
(Dwg. No. 696-5902-00, R-0)

4.2.4 MICROPROCESSOR (uP) CONTROLLER AND DISPLAY

The microprocessor controls the frequency of the transmitter and receiver (Figure 4-5). The "use" and "standby" frequencies are stored in the microprocessor's memory and are decoded to provide the segment and digit information required to drive the display. The "use" frequency information is also used to generate the codes required by the program and swallow counters to synthesizer the frequency generated by the voltage controlled oscillator (VCO). The "use" and "standby" frequencies are also stored in non-volatile memory which remembers the frequencies while the transceiver is turned off. The microprocessor also receives the information from the increment/decrement switch which is used to either increase or decrease the "standby" frequency. The "standby" frequency can then be used to control the operating frequency of the transceiver only after being interchanged with the "use" frequency. During the receive mode of operation, the PTT voltage causes the microprocessor to change the code going to the synthesizer to offset the VCO frequency by 11.4MHz. During the transmit mode A "T" is visible in the display window. During operation in low light levels (night operation), a photocell is used to decrease the intensity of the display automatically. A display dimmer adjustment is provided for setting the brightness to the most pleasing level during night operation.

4.2.5 POWER SUPPLY

The 27.5VDC (13.75 for KY 197) from the aircraft buss is fed to the transceiver through a switch on the volume control shaft, a fuse and a hash filter (Figure 4-6). A power transistor is used to provide regulated 12 volts (unregulated 12V for KY 197) for the modulator, transmitter and audio power amplifier. A switching regulator is used to provide power for the remaining sections of the transceiver. The toroid transformer has windings which supply 192 volts for the gas discharge display, 9 volts for receiver, modulator pre-amp, microphone bias, VCO buffers and PTT switching, 5 volts for the logic circuits and -26 volts for the non-volatile memory.

4.3 DETAILED CIRCUIT THEORY

4.3.1 RECEIVER (see receiver schematic in section VI)

4.3.1.1 Antenna Input Circuit

In the receive mode one side of R301 is switched low by $\overline{RC}$ thus causing Q101 to conduct through the T/R diode (CR623) which is located on the transmitter PC board. The desired signal passes through the low pass filter, then through CR623 to the receiver PC board where C301 steps up the impedance to match the first pole of the preselector. Varactor diodes CR301 and CR302 tune the double tuned circuit to the desired frequency. The desired signal is coupled to gate one of the RF amplifier through C308.

4.3.1.2 RF Amplifier

Q302 is a dual gate, enchancement mode, N-channel field-effect transistor with internal diodes to protect the gates against damage due to transients during handling. It provides the necessary high gain, low noise figure, good cross modulation immunity and wide AGC range required in this amplifier. Gate #1 has a positive bias with respect to the source so that the quiescent operating point provides maximum gain when gate #2 is near the supply voltage. Reverse AGC is required to decrease the RF gain. As the gate #2 voltage is decreased to near 0 volts, the FET has approximately 40dB of attneuation, thus providing more than 50dB of AGC range. C311 couples the signal into the double tuned interstage bandpass filter. Varactor diode CR305 tunes the circuit. Inductor L307 provides the coupling between the two poles and improves the image rejection in the front end.

4.3.1.3 Mixer

The mixer input circuit is tuned by varactor CR304. Capacitor CR318 couples the desired signal to gate #1 of the mixer. The mixer is also a dual gate FET as is the RF amplifier. Both gate #1 and gate #2 are biased positive with respect to the source by the same amount. The local oscillator signal is fed into gate #2 at approximately 2 volts peak to peak. The FET provides more than 20dB of isolation between G_1 and G_2. The drain is tuned to 11.4MHz by T301 which also matches the FET into the 4100 ohm crystal filter. The desired signal is now at 11.4MHz due to the L.O. being 11.4MHz above the incoming signal.

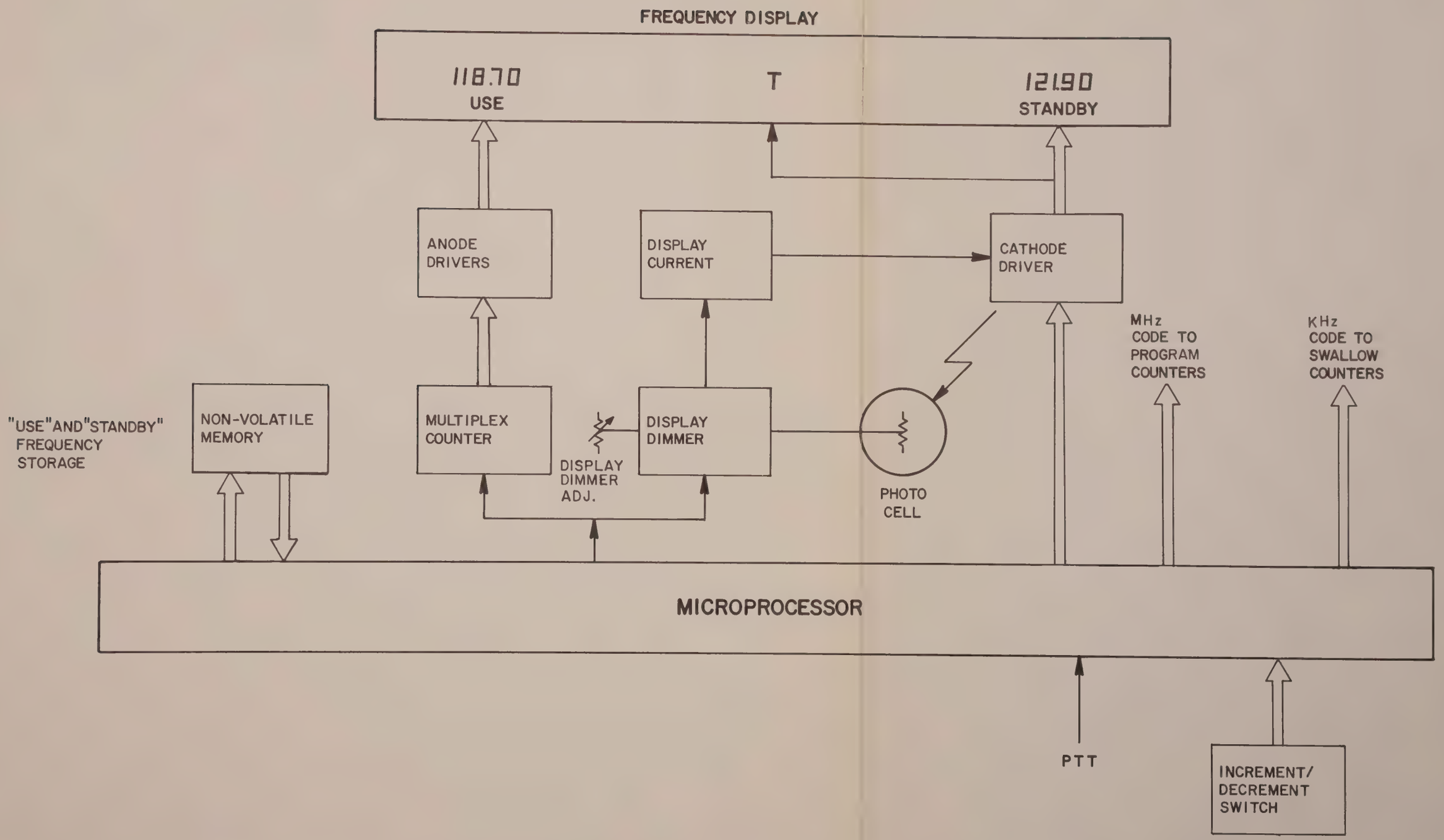

FIGURE 4-5 MICROPROCESSOR CONTROLLER AND DISPLAY
(Dwg. No. 696-5903-00, R-0)

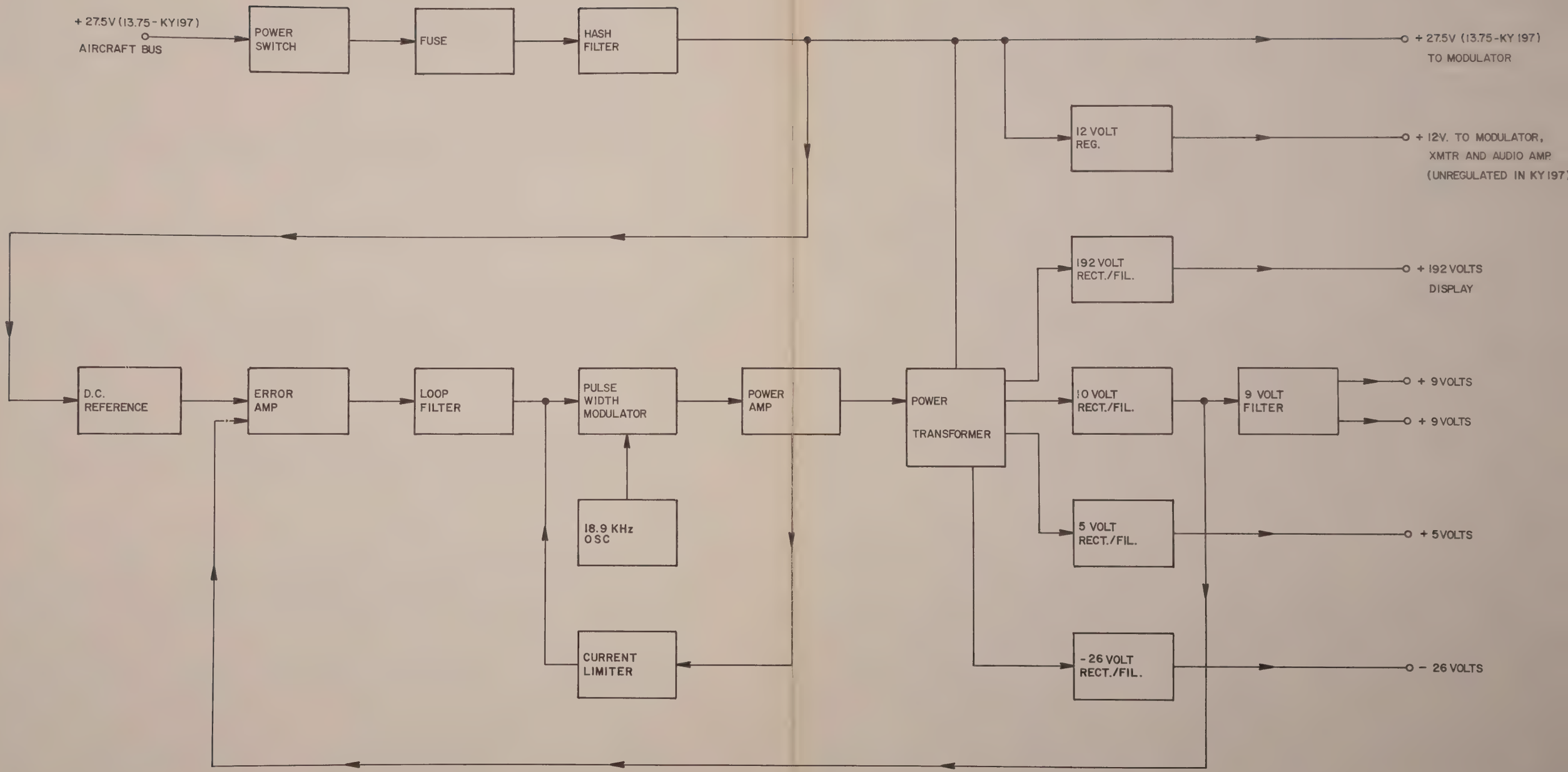

FIGURE 4-6 POWER SUPPLY BLOCK DIAGRAM
(Dwg. No. 696-5904-00, R-0)

4.3.1.4 First IF Amplifier

The crystal filter provides the desired narrow bandpass for the receiver. The signal passes through the crystal filter and is coupled through T302 to the input of I303, the IF amplifier. AGC current is applied to pin 5 and provides approximately 70dB of AGC range. Transformer T304 tunes the collector circuit to 11.4MHz and provides the impedance stepdown required to match into the second IF amplifier.

4.3.1.5. Second IF Amplifier

Q304 is the second IF amplifier. It provides the necessary gain, AGC and output capability required to drive the detector. Forward AGC is applied to the base through R326 and provides up to 30dB of range. Transformer T303 tunes the collector to 11.4MHz and matches to the detector.

4.3.1.6 Detector

Transistor I301D is the amplitude modulated detector. It is biased near collector cut-off by transistor I301E, which is diode connected to provide stable bias and temperature compensation.

4.3.1.7 IF AGC Circuit

AGC voltage is derived from the average value of the detector collector voltage. Operational amplifier I304B compares this voltage with the DC reference from R333 and R334, amplifies it, filters out the audio variations, inverts it and feeds it back to the 1st and 2nd IF amplifiers. Thus, as the detector collector voltage decreases (with an increase in signal level) the AGC voltage increases which decreases the gain in the 2nd IF amplifier. Test point TP102, is provided for easy access to this voltage. Delayed AGC is applied to the first IF amplifier through R328.

4.3.1.8 RF AGC Circuit

Delayed AGC is provided for the RF amplifier by I304A. The RF input level at which the RF AGC begins to take effect is set by resistor R338. The RF AGC voltage can be measured on TP304. As the IF AGC voltage exceeds the set reference, the RF AGC voltage decreases, thus decreasing the gain in the RF amplifier.

4.3.1.9 Noise and Carrier Squelch Circuit

Transistor I302D amplifies the noise from the collector of the detector and limits its amplitude so that impulse spikes (such as ignition noise) will not be of higher amplitude than other noise. The output is lightly coupled to the tuned circuit L309 and C369 which is tuned to approximately 8KHz. Transistor I302C detects the noise at 8KHz, that is passed by the filter, amplifies it and feeds it to the base of transistor I302B. Resistor R344 is set so that the detected noise causes the base voltage of I302B to be low and its collector voltage to be high. Therefore, I301B is "on" and no emitter current is supplied to the squelch gate I301A and no audio signal is allowed to pass.

When a signal is received, the noise output from the detector decreases; thus, less noise is being fed to the noise detector I302C. Its collector is allowed to rise until transistor I302B conducts, decreasing the base voltage I301B base, thus supplying emitter current for the squelch gate I301A and allowing the received audio to pass.

Switch S102 is coupled to the volume control shaft to allow the operator to open the squelch gate manually. When the shaft is pulled out, switch S102 closes, shorting the base of the noise detector I302C to ground, causing the collector to rise toward the 9 volt supply, which turns on I302B, as above, which opens the squelch gate to allow the audio signal to pass.

Carrier operated or backup squelch operation is available when the received signal has a great deal of noise on the carrier; thus the noise detector keeps the squelch gate closed. As the carrier level increases to exceed the reference set by R338 "CARR SQ ADJ" and the RF AGC voltage decreases, transistor I302A turns "OFF" causing I302B to turn "ON". Again, as the collector of I302B decreases, I301B is turned "OFF", and squelch gate I301A allows the received audio to pass.

4.3.1.10 Audio Low Pass Filter

Inductor L310 and its associated capacitors form a low pass, elliptical filter. The design is such that a half power point occurs at 2.5KHz and a null occurs at 5KHz. The null, which is better than 25dB down, provides attenuation of audio hetrodynes which may occur in "climax network" environments.

4.3.1.11 Audio Amp

The audio signal is fed from the wiper of the volume control to pin 8 of I119B. The signal is amplified approximately 63dB and capacitively coupled through C147 to auto-transformer T103. The voltage and impedance are stepped up to provide a minimum of 100mw of audio power into a 500 ohm load such as headphones or an audio mixer. The output is fed through R220 to pin B on the rear panel connector.

4.3.2 TRANSMITTER

4.3.2.1 RF Amplifier

RF is fed from the transmit buffer to the RF amp, on the transmitter printed circuit board, through a short length of miniature 50 ohm coaxial cable. The drive level is approximately 60mw. During receive mode, this drive is attenuated as RC goes high, turning "ON" Q601, shorting the drive to ground and reverse biasing pin diode CR604 to "OPEN" the input to Q602. During transmit mode, base current is supplied through R602 and CR604 to operate Q602 class A. Transformer T601 is broadband tuned and steps the collector impedance down to the input impedance of the pre-driver.

4.3.2.2 Pre-Driver

RF drive is fed to pre-driver, Q603 through C633 and C606. The pre-driver is operated class C and receives "UP" modulation of its collector supply voltage through resistor diode network CR601/R606 and CR602/R607. The collector is broadband tuned and is coupled to the driver by T602.

4.3.2.3 Driver (omitted in KY 197)

RF drive is supplied to the base through capacitive network C610, C611 and C612. Q604 is operated class C and the collector supply voltage is fully modulated. The collector is broadband tuned by T603 which also matches the collector to the input of the final.

4.3.2.4 Final

Capacitors C618, C619 and C620 form the input matching network for the final power amplifier, Q605. The final is operated class C and its collector is fully modulated. The low collector output impedance is stepped up to 50 ohms by transformer T604.

4.3.2.5 Low Pass Filter

A three section elliptic function low pass filter is placed between the final and the antenna to attenuate all harmonic which may be generated in the transmitter. During the receive mode T/R diode CR603 is forward biased to feed the desired signal from the antenna through the low pass filter to the receive RF amplifier.

4.3.3 MODULATOR

4.3.3.1 Microphone Input Circuit

The microphone is connected to pin C on the rear panel connector. Mic bias is supplied by R161. The audio signal passes through C137 to "Mic Gain" control, R159.

4.3.3.2 Mic Pre-Amp

The audio from R159 is fed through C171 and R157 to the base of the mic pre-amp, Q125.

4.3.3.3 Modulation Limiter

The output of the pre-amp is fed to the modulation limiter CR103 and CR121. The level from the clipper is sufficient to insure 85% modulation without exceeding 100%. Field effect transistor Q126 is used as a switch to open the mic audio during the receive mode.

4.3.3.4 Modulation Driver

During transmit, R167 is used to sample a small amount of mic audio and feed it to the receiver's audio amplifier for sidetone. The mic audio is fed through R215 and C150 to I119A. The output is capacitively coupled to transformer T104.

4.3.3.5 Modulator

Transformer T104 supplies the audio drive necessary to cause the emitters of the modulator transistors Q121 and Q122 to swing from 1 to 24 volts (0 to 12 for KY 197). The transistors are Darlington compound connected. Resistors R185 and R186 are in the emitters to equalize currents. The collectors are connected to the 27.5 volt (13.75 for KY 197) supply.

4.3.4 STABILIZED MASTER OSCILLATOR

4.3.4.1 Reference Oscillator

Integrated circuit I110 is used as the oscillator divider to provide the 25KHz reference. A 3.2MHz crystal Y101 is connected to the input buffer in a modified Colpitts oscillator circuit. Capacitors C110 and C108 provide the impedance matching the feedback ratio while C109 is used to vary the capacitive load across the crystal to adjust the frequency. The output of the oscillator is fed through internal buffers to the dividers. The output of the seventh flip-flop provides the desired $\div 2^7$ or $\div 128$ to provide 25KHz for the phase detector.

4.3.4.2 Phase Detector

A portion of integrated circuit I108 is used as the phase detector. The reference signal is fed to one input (pin 3) and output of the programmable divider is fed into the second input (pin 14).

4.3.4.3 Loop Filter

The output of the phase detector is fed to the loop filter comprised of R384, C349, L311, C350, C352, R168, R388 and C351. The pulsating DC on the output of the phase detector has a DC component that is proportional to the oscillator frequency. The elliptic low-pass filter attenuates components at the reference frequency (25KHz) that are present in the phase-detector output.

4.3.4.4 Voltage Controlled Oscillator

The voltage controlled oscillator is a modified Hartley type oscillator operating on the transmit frequency in the transmit mode and 11.4MHz above the desired receive frequency when providing the LO signal in the receive mode. An error voltage from the phase detector is applied to the varactor CR312 for phase 1 frequency correction. Buffer stage Q307 isolates the VCO and provides LO injection to the mixer through a stripline conductor. Digital buffers, Q105 and Q104, supply drive back to the digital dividers. Q106 and Q107 isolate the transmitter from the VCO and amplify the signal to approximately 60mw to drive the transmitter. If the synthesizer should malfunction, an out of lock signal will turn Q108 off and Q109 on. This removes base bias from the transmit buffer thus turning the transmitter off. Also, during the receive mode, Q109 is biased on by RC and limiting the radiation of the L.O. signal.

4.3.4.5 Programmable Divider

The signal from the digital buffers Q104 and Q105 is fed to the high speed divider I101.

This divider which can divide by 10 or 11 is used to drive a divide-by-four circuit (I102). At all discrete megacycle channels the prescaler is programmed to divide by 10, and consequently a total divide of 40 occurs before the signal reaches the program counter (I106, I107). The program counter can be programmed by the microprocessor to divide by an integer from 118 through 145. The result is a total division of 4720 (40 x 118) to 5800 (40 x 145) in steps of 40. The output from the program counter is fed to pin 3 of the phase detector I108.

Another counter, termed the "swallow" counter, is used to program the "fraction-of-megacycle" frequencies. The "swallow" counter (I104, I105) controls the prescaler (I101) division. It is programmed by the microprocessor to cause the prescaler to divide by 11 (instead of 10) anywhere from 0 to 39 times during the program count sequence. Each time the prescaler divides by 11, one pulse (cycle) of the VCO frequency is effectively ignored or "swallowed". This action is equivalent to increasing the total count in the dividers by one and consequently increasing the channel frequency by 25KHz for each divide by 11. Therefore, each whole megacycle can have N x 25KHz added where N ranges from 0 to 39. This produces the 25KHz steps from 0KHz to 975KHz.

4.3.5 MICROPROCESSOR CONTROLLER AND DISPLAY

4.3.5.1 Frequency Code

The microprocessor (uP), I111, has been programmed to generate a binary code for two frequencies, the "use" and the "standby". The MHz portion of the "use" frequency is fed to the program counters, I106 and I107. The KHz portion is fed to the swallow counters, I104 and I105. The frequency of the VCO is now controlled by the "use" frequency code. The "use" code which may be sent from the microprocessor to the programmable dividers is shown in Tables 4-1, 4-2, 4-3, and 4-4.

The code for the "use" and "standby" frequency is not only stored internally in the microprocessor, but is also stored in an external non-volatile memory, I112. When power is applied to the unit, the microprocessor is programmed to read the last frequencies stored in the non-volatile memory and utilize them as the initial "use" and "standby" frequencies. Should the non-volatile memory fail, the microprocessor will display 120.00MHz as its initial frequencies. The non-volatile memory will store the codes for the two frequencies for an indefinite period without power applied to the transceiver.

4.3.5.2 Display

The microprocessor feeds the code for the "use" and "standby" frequencies to the display drivers. A BCd code for each digit is fed to the BCD decoder cathode/driver, I503. A multiplex clock pulse if fed to a 1 of 8 counter, I501, which drives each digit through the anode driver, I502. In this manner, the appropriate segments of each digit are lighted one digit at a time at approximately 110 times per second. A synchronizing pulse is sent to the 1 of 8 counter, I501, every 8 cycles by the microprocessor to maintain synchronization with the display. This display is a gas discharge type with its intensity controlled by a photocell, V501, located in the display window to the left of the "use" frequency. As the light reaching the photocell decreases, the pulse width produced by I115 and I116A becomes narrower; also, the current being supplied to the cathode driver, I503, by the current source, I116B, is decreased providing a 48:1 ratio of light dimming.

4.3.5.3 Frequency Selection

The microprocessor is programmed to cause the frequency selector switch to increase or decrease the "standby" frequency by 1MHz for clockwise or counterclockwise detent rotation of the larger knob. Incrementing 135MHz will cause the frequency to rollover to 118MHz and, similarly, decrementing 118MHz will rollover to 135MHz.

The smaller knob is used to increase or decrease the "standby" frequency by either 25KHz or 50KHz, depending upon the position of the push-pull switch associated with this knob. If the knob is pushed in the frequency will change to the next higher or lower 50KHz channel. If the switch is pulled out, the frequency will change by 25KHz.

SELECTED FREQUENCY TRANSMIT (MHz)	PROGRAM COUNTER (MHz CODE)					
	I107		I106			
	Pin 4 P5	Pin 3 P4	Pin 6 P3	Pin 5 P2	Pin 4 P1	Pin 3 P0
118	1	0	1	0	1	0
119	1	0	1	0	0	1
120	1	0	1	0	0	0
121	1	0	0	1	1	1
122	1	0	0	1	1	0
123	1	0	0	1	0	1
124	1	0	0	1	0	0
125	1	0	0	0	1	1
126	1	0	0	0	1	0
127	1	0	0	0	0	1
128	1	0	0	0	0	0
129	0	1	1	1	1	1
130	0	1	1	1	1	0
131	0	1	1	1	0	1
132	0	1	1	1	0	0
133	0	1	1	0	1	1
134	0	1	1	0	1	0
135	0	1	1	0	0	1

TABLE 4-1 TRANSMIT MHz CODE

SELECTED FREQUENCY TRANSMIT (KHz)	SWALLOW COUNTER (KHz CODE)					
	I104		I105			
	Pin 4 B5	Pin 3 B4	Pin 6 B3	Pin 5 B2	Pin 4 B1	Pin 3 B0
000	1	1	1	0	0	1
025	1	1	1	0	0	0
050	1	1	0	1	1	1
075	1	1	0	1	1	0
100	1	1	0	1	0	1
125	1	1	0	1	0	0
150	1	1	0	0	1	1
175	1	1	0	0	1	0
200	1	1	0	0	0	1
225	1	1	0	0	0	0
250	1	0	1	0	0	1
275	1	0	1	0	0	0
300	1	0	0	1	1	1
325	1	0	0	1	1	0
350	1	0	0	1	0	1
375	1	0	0	1	0	0
400	1	0	0	0	1	1
425	1	0	0	0	1	0
450	1	0	0	0	0	1
475	1	0	0	0	0	0
500	0	1	1	0	0	1
525	0	1	1	0	0	0
550	0	1	0	1	1	1
575	0	1	0	1	1	0
600	0	1	0	1	0	1
625	0	1	0	1	0	0
650	0	1	0	0	1	1
675	0	1	0	0	1	0
700	0	1	0	0	0	1
725	0	1	0	0	0	0
750	0	0	1	0	0	1
775	0	0	1	0	0	0
800	0	0	0	1	1	1
825	0	0	0	1	1	0
850	0	0	0	1	0	1
875	0	0	0	1	0	0
900	0	0	0	0	1	1
925	0	0	0	0	1	0
950	0	0	0	0	0	1
975	0	0	0	0	0	0

TABLE 4-2 TRANSMIT KHz CODE

SELECTED FREQUENCY RECEIVE (MHz)	PROGRAM COUNTER (MHz CODE)					
	I107		I106			
	Pin 4 P5	Pin 3 P4	Pin 6 P3	Pin 5 P2	Pin 4 P1	Pin 3 P0
118.000 - 118.575	0	1	1	1	1	1
118.600 - 119.575	0	1	1	1	1	0
119.600 - 120.575	0	1	1	1	0	1
120.600 - 121.575	0	1	1	1	0	0
121.600 - 122.575	0	1	1	0	1	1
122.600 - 123.575	0	1	1	0	1	0
123.600 - 124.575	0	1	1	0	0	1
124.600 - 125.575	0	1	1	0	0	0
125.600 - 126.575	0	1	0	1	1	1
126.600 - 127.575	0	1	0	1	1	0
127.600 - 128.575	0	1	0	1	0	1
128.600 - 129.575	0	1	0	1	0	0
129.600 - 130.575	0	1	0	0	1	1
130.600 - 131.575	0	1	0	0	1	0
131.600 - 132.575	0	1	0	0	0	1
132.600 - 133.575	0	1	0	0	0	0
133.600 - 134.575	0	0	1	1	1	1
134.600 - 135.575	0	0	1	1	1	0
135.600 - 135.975	0	0	1	1	0	1

TABLE 4-3 RECEIVE MHz CODE

SELECTED FREQUENCY RECEIVE (KHz)	SWALLOW COUNTER (KHz CODE)					
	I104		I105			
	Pin 4 B5	Pin 3 B4	Pin 6 B3	Pin 5 B2	Pin 4 B1	Pin 3 B0
000	1	0	0	0	1	1
025	1	0	0	0	1	0
050	1	0	0	0	0	1
075	1	0	0	0	0	0
100	0	1	1	0	0	1
125	0	1	1	0	0	0
150	0	1	0	1	1	1
175	0	1	0	1	1	0
200	0	1	0	1	0	1
225	0	1	0	1	0	0
250	0	1	0	0	1	1
275	0	1	0	0	1	0
300	0	1	0	0	0	1
325	0	1	0	0	0	0
350	0	0	1	0	0	1
375	0	0	1	0	0	0
400	0	0	0	1	1	1
425	0	0	0	1	1	0
450	0	0	0	1	0	1
475	0	0	0	1	0	0
500	0	0	0	0	1	1
525	0	0	0	0	1	0
550	0	0	0	0	0	1
575	0	0	0	0	0	0
600	1	1	1	0	0	1
625	1	1	1	0	0	0
650	1	1	0	1	1	1
675	1	1	0	1	1	0
700	1	1	0	1	0	1
725	1	1	0	1	0	0
750	1	1	0	0	1	1
775	1	1	0	0	1	0
800	1	1	0	0	0	1
825	1	1	0	0	0	0
850	1	0	1	0	0	1
875	1	0	1	0	0	0
900	1	0	0	1	1	1
925	1	0	0	1	1	0
950	1	0	0	1	0	1
975	1	0	0	1	0	0

TABLE 4-4 RECEIVE KHz CODE

4.3.5.4 Display Transfer

The transfer switch is a momentary switch which causes the "use" and "standby" frequencies to exchange positions. This action can be thought of as an "activate" for the standby frequency or a "store" for the use frequency.

4.3.5.5 Receive/Transmit

When the transceiver is in the receive mode, the microprocessor adds 11.4MHz to the synthesizer preset codes being fed to the programmable dividers. Thus, the VCO shifts 11.4MHz higher than the desired signal. A logic "0" on pin 6 of the microprocessor, I111, causes this change.

When in the transmit mode, a logic "1" is fed to pin 6 of I111 and a "T" is illuminated between the "use" and "standby" frequencies in the display window.

4.3.6 POWER SUPPLY

4.3.6.1 27.5 Volt Supply (13.75V for KY 197)

The 27.5 volt (13.75 for KY 197) aircraft buss is fed through the power switch on the volume control shaft, then through a jumper on the rear panel connector to a fuse and hash filter, L112 and C155. This provides a clean source of power for the modulator, 12 volt regulator and the switching regulator.

4.3.6.2 12 Volt Regulator (6 volts for KY 197)

The 12 volt (6 for KY 197) regulator is a Darlington connected power transistor, Q120. The collector is connected to +27.5 volts (13.75 for KY 197). The base is connected to a voltage divider made up of resistors R181, R182/RT101 and R184. The regulated 12 volts (6 for KY 197) on the emitter is set at the factory, by resistors R181 and R184, to provide the desired transmitter power output by varying the DC supply voltage being fed by the modulator transistors to the transmitter power amplifiers. Posistor RT101 is mounted to the heatsink of Q120 and connected so that under extremely high temperture operation the +12 volt (6 for KY 197) line is decreased to reduce the power dissipation in the transmitter and thereby prevent damage to the semiconductors.

4.3.6.3 Switching Regulator

Comparator I118A is connected as a 20KHz oscillator. Its output is fed through pulse width modulator I118D to emitter follower Q113, which drives the switching transistor Q114. Q114 is connected to switching transformer T102. T102 connects to the 27.5 volt (13.75 for KY 197) supply through low pass filter L113 and C159. When Q114 conducts, the current in the primary winding of T102 increases. Then as Q114 turns off its collector current drops to zero, power is transferred to the secondary and the diodes on the secondary conduct, delivering power to the loads.

Diode CR112 is the high voltage rectifier and capacitor C161 is the filter. Q115 is a current limit and feeds the high voltage (approx. 192 volts) to the gas discharge display.

Diode CR114 is the rectifier on the 5 volt tap and C163 is the filter capacitor. This is the supply for the TTL and ECL logic circuits and the microprocessor.

CR115 is the rectifier on the -26 volt tap and C164 is the filter capacitor. The -26 volt supply feeds power to the non-volatile memory, I112.

CR113 is the rectifier and C162 is the filter on the 10 volt tap of T102. The 10 volt supply feeds the 9 volt filter consisting of Q116, Q117, Q118, C167, R208 and R209. This filtered 9 volt point feeds power to the receiver, VCO buffers, mic bias and the CMOS logic circuits. The 10 volt supply is sampled by resistors R189 and R191 and fed to the error amp, I118B. It is compared with the 5 volt reference from I117 and the difference between the two voltages is amplified and fed through the loop filter R195, C144, R210, R196 and C157. The voltage from the loop filter is compared with the triangle-wave signal from the 20KHz oscillator and produces the proper pulse width to obtain the desired output voltage. Also, the emitter current of the switching transistor Q114 is sampled by R205 and fed to the comparator, I118C. If Q114 emitter voltage exceeds the reference set by R192, R190 and R193, the current limit amp, I118C, lowers the input voltage on the pulse width modulator, thus decreasing the pulse width which decreases the drive to the switching transistor. Therefore, the supply is regulated for input voltage variations, output load variations and current limit protection for the switching transistor. Overvoltage protection is provided by diode CR118. If the 5 volt supply increases more than one diode drop above the reference between R189 and R191, it causes the output of the error amp, I118B, to go to zero volts which decreases the drive to the switching transistor to its minimum value.

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MAINTENANCE

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SECTION V
MAINTENANCE

5.1 GENERAL INFORMATION

Before maintenance of the KY 196/KY 197 is attempted, a thorough understanding of the theory of operation (Section IV) as well as the information on transistor and integrated circuit maintenance is needed. This material is contained in Appendix A. Detailed information on the various integrated circuit packages used in the KY 196 is also found in this reference.

5.2 TEST AND ALIGNMENT

The following procedure is for aligning a KY 196/KY 197 so it will meet the minimum performance specifications. If partial alignment is desired, use only the initial control settings that apply to the section being aligned.

5.2.1 GENERAL INFORMATION

A. "Hard" microvolts indicates use of a 6dB pad between the signal generator and the receiver. (Example: A receiver with 6dB s+n/n at 2uv hard must have 1uv of sensitivity).

B. A standard modulator test signal is a .4VRMS, 1KHz tone, open circuit, with the network shown in Figure 5-3.

5.2.2 TEST EQUIPMENT

The following test equipment, or equivalent, is required to properly align and test the KY 196/197. All test equipment must be calibrated before attempting alignment.

A. Power Supply: Sorensen SRL 40-6 (27.5V @ 6 AMPS) or equivalent

B. RF Signal Generator: Boonton Model 211A or equivalent

C. Audio Signal Generator: HP 200CD

D. Digital Multimeter: Fluke 8000A

E. RF Wattmeter: Bird Model 611

F. Frequency Counter: HP 5245L

G. Audio Wattmeter with Load: Eico Model 261

H. Oscilloscope: Tektronix Model 454 or equivalent

I. RF Signal Generator: HP 606A

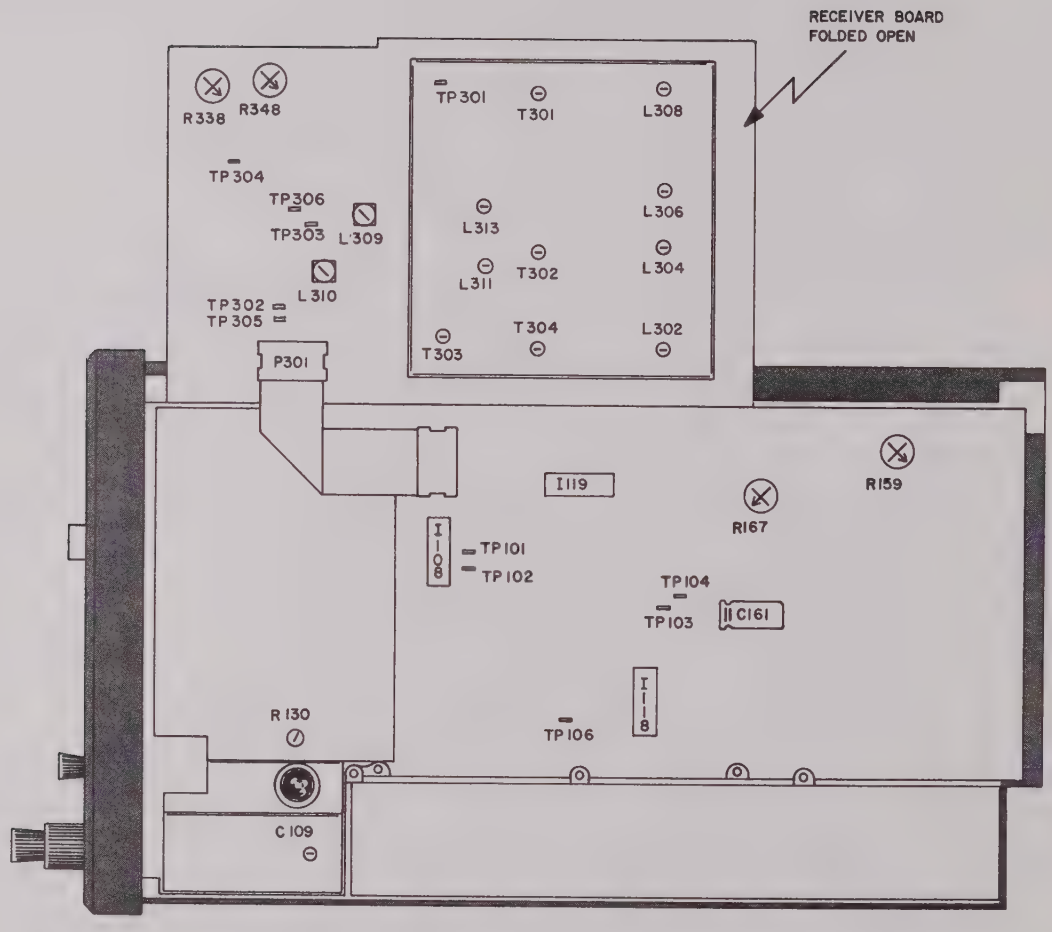
J. Linear Detector: Figure 5-5

K. Test Harness: Figure 5-5

L. 40dB Attenuator: Figure 5-4

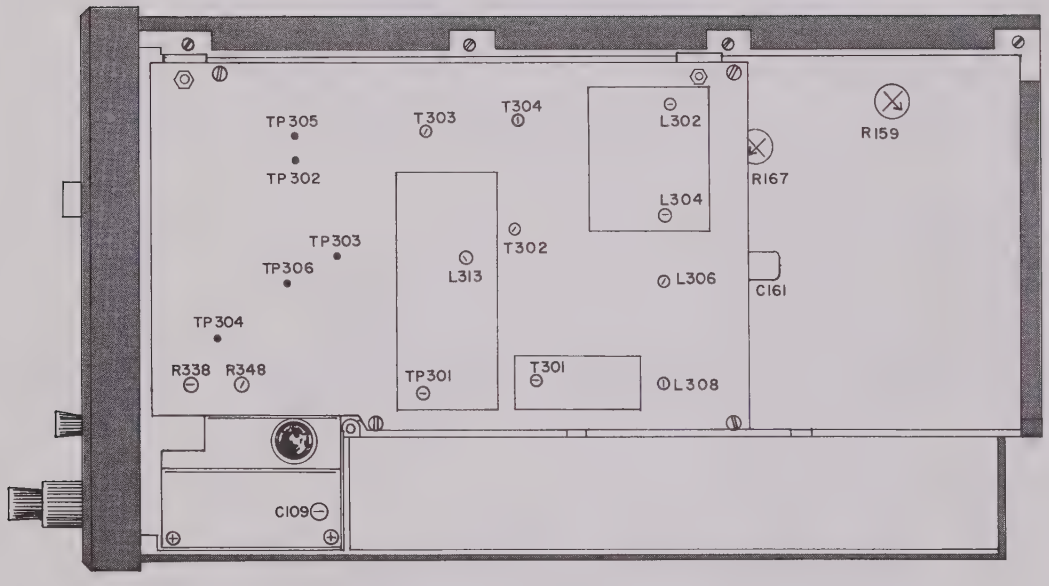
5.2.3 ALIGNMENT PROCEDURE

This alignment procedure is written for a transceiver that has been recently overhauled. If partial alignment is desired, use only the initial control settings that apply to the section being aligned. The receiver squelch adjustments must be done in the correct sequence.



TOP VIEW

FIGURE 5-1 LOCATION OF ADJUSTMENTS AND TEST POINTS
(Dwg. No. 696-5905-00, R-0)



TOP VIEW

FIGURE 5-2 LOCATION OF ADJUSTMENTS AND TEST POINTS WITH RECEIVER BOARD CLOSED
(Dwg. No. 696-5906-00, R-0)

5.2.3.1 Initial Control Settings (Ref Figure 5-1)

*R348	Noise Squelch	Max CW
R159	MIC Gain	Mid Range
*R338	Carrier Squelch	Max CW
R167	Sidetone	Mid Range
R505	Volume Control	Max CCW (OFF)
S102	Squelch Test "Use" Frequency	Pull Out 135.975
R130	Display Dimmer	Max CCW

*These settings apply when receiver board is closed and adjustment made through the PC board.

5.2.3.2 Voltage Regulator Test

Connect unit to RF load. Apply power and advance volume to turn unit on. Read voltage at TP106 (9.00 volts ± 0.5VDC).

5.2.3.3 VCO Adjust (L313)

Read voltage at TP301 and adjust L313 for 8.00 volts with 135.975MHz selected.

5.2.3.4 Frequency Adjust (C109)

Count VCO frequency at junction of R382 and C330 through access hole on rear of receiver board with frequency selector at 135.975MHz and adjust C109 for a reading of 147,375,000. This adjustment must be completed within 60 seconds of initial turn on at normal room temperature (75 ± 5°F) to ensure temperature tracking within M.P.S. limits over the temperature range.

5.2.3.5 RF-IF Alignment

NOTE

Be sure transmitter is not keyed!

Set the "use" frequency to 126.50MHz. Connect RF signal generator to the KY 196 through a 6dB pad. Turn unit on with squelch test pulled out and apply sufficient RF signal to obtain approximately 3.0V at TP303. Adjust L302, L304, L306, L308, T301, T302, T303 and T304 for maximum voltage at TP303. Reduce RF input level to maintain the voltage at TP303 near 3.0 volts.

5.2.3.6 Noise Squelch Adjust (L309) R348)

a. Push squelch test knob in and observe signal at TP306 with oscilloscope. Set the RF signal generator for 25uv hard with 85% modulation at 8KHz. Adjust L309 for maximum p-p voltage as observed on the oscilloscope.

b. Apply 2.0uv hard modulated 30% with a 1KHz tone and turn R348 (noise squelch) clockwise until the receiver is just squelched (no audio output).

5.2.3.7 Carrier Squelch Adjust (R338)

Apply 25uv hard, modulated 85% with 8KHz and adjust R338 CCW until the receiver is just squelched.

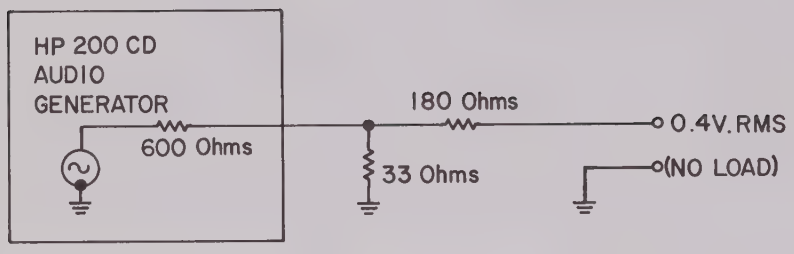


FIGURE 5-3 MICROPHONE TEST CIRCUIT

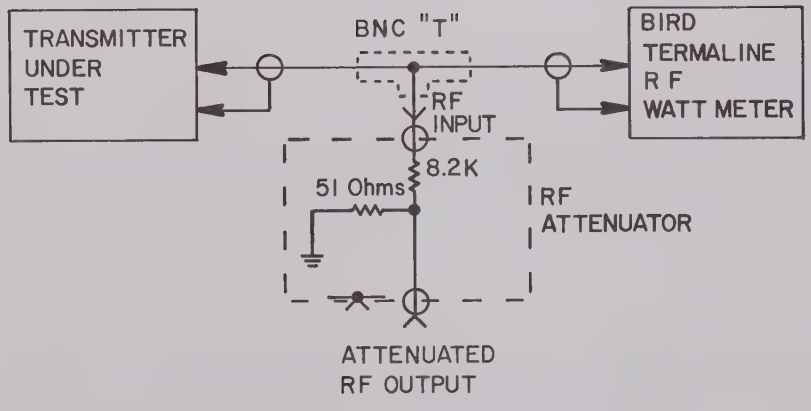


FIGURE 5-4 40dB ATTENUATOR SCHEMATIC DIAGRAM

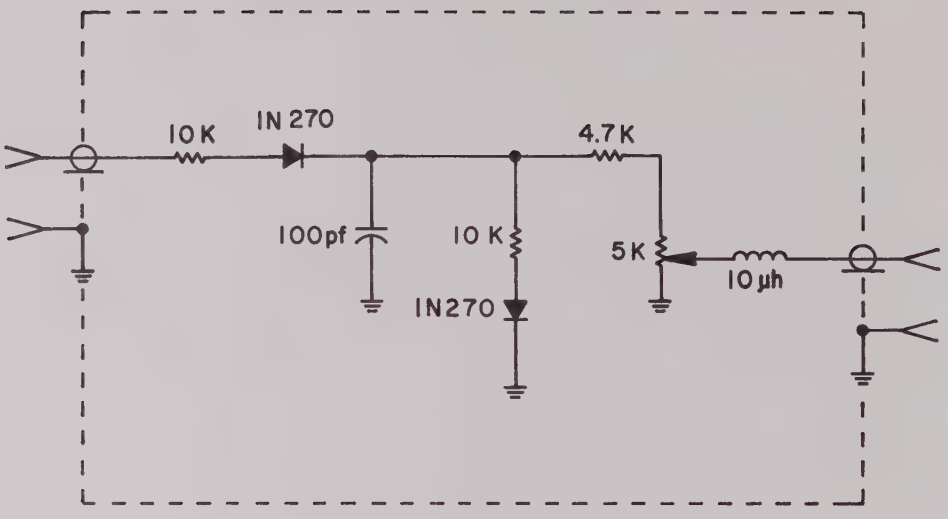


FIGURE 5-5 LINEAR DETECTOR

5.2.3.8 Climax Filter Adjustment

Apply 100uv of RF modulated 30% with 5KHz and read the speaker output voltage. Set the volume control to a convenient level and adjust L310 for minimum speaker output voltage (null).

5.2.3.9 Modulator Adjust

Connect the antenna connector to the RF wattmeter through the linear detector. Apply a 0.4 volt 1KHz standard audio signal to the mic input and key the transmitter. Observe the demodulated output from the linear detector on an oscilloscope and adjust R159 (mic gain) for 85% modulation. Adjust R167 (sidetone adj.) for 100mw at the audio output with a 500 ohm load. Unkey transmitter.

5.3 OVERHAUL

5.3.1 VISUAL INSPECTION

This section contains instructions to assist in determining, by inspection, the condition of the KY 196/197 assemblies. Defects resulting from wear, physical damage, deterioration, or other causes can be found by these inspection procedures. To aid inspection, detailed procedures are arranged in alphabetical order.

A. Capacitors, Fixed

Inspect capacitors for case damage, body damage, and cracked, broken or charred insulation. Check for loose, broken or improperly soldered connections.

B. Capacitors, Variable

Inspect trimmers for chipped and cracked bodies, damaged contacts.

C. Chassis

Inspect the chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, loose or missing hardware, component corrosion, and damage to finish.

D. Connectors

Inspect connector for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Also, check for corroded or damaged plating on contacts and for loose, improperly soldered, broken or corroded terminal connections.

E. Covers and Shields

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Also, check for damaged fastener devices, corrosion, and damage to finish.

F. Fuse and Clips

Inspect for blown fuse and check clips for loose or corroded connections.

G. Insulators

Inspect all insulators for evidence of damage, such as broken or chipped edges, burned areas, and presence of foreign matter.

H. Jacks

Inspect all jacks for corrosion, rust, deformations, loose or broken parts, cracked insulation, bad contacts, or other irregularities.

I. Potentiometers

Inspect all potentiometers for evidence of damaged or loose terminals, cracked insulation, or other irregularities.

K. Resistors, Fixed

Inspect the fixed resistors for cracked, broken, blistered, or charred bodies and loose, broken, or improperly soldered connections.

L. RF Coils

Inspect all RF coils for broken leads, loose mountings, and loose, improperly soldered, or broken terminal connections. Check for crushed, scratched, cut or charred windings. Inspect the windings, leads, terminals, and connections for corrosion or physical damage. Check for physical damage to forms and tuning slug adjustment screws.

M. Terminal Connections Soldered

1. Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the points of a tool.

2. Examine the terminals for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other components.

3. Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at the terminal. Check for insulation that is stripped back too far from the terminal.

4. Inspect for corrosion at the terminal.

N. Transformers

1. Inspect for signs of excessive heating, physical damage to case, cracked or broken insulation, and other abnormal conditions.

2. Inspect for corroded, poorly soldered, or loose connecting leads or terminals.

O. Wiring/Coaxial Cable

Inspect open and laced wiring of chassis, subassembly chassis, and parts of equipment for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis.

5.3.2 CLEANING

A. Using a clean, lint-free cloth lightly moistened with a mild cleaning detergent, remove all foreign matter from the equipment case and unit front panels. Wipe dry using a clean, lint-free cloth.

B. Using a hand controlled dry air jet (not more than 15psi), blow the dust from inaccessible areas. Care should be taken to prevent damage by the air blast.

C. Clean the receptacle and plugs with a hand controlled dry air jet (not more than 25psi) and a clean, lint-free cloth lightly moistened with an approved mild cleaning solvent. Wipe dry with a clean, dry, lint-free cloth.

5.3.3 REPAIR

This section describes the procedure, along with any special techniques for replacing damaged or defective components.

A. Connectors

When replacing a connector, refer to the appropriate PC board assembly drawing and follow notes to insure correct mounting and mating of each connector.

B. Crystal

The use of other than a King crystal is considered an unauthorized modification.

C. Diodes

Diodes used are silicon and germanium; use long nose pliers as a heat sink under normal soldering conditions. Note the diode polarity before removal.

D. Integrated Circuits

Refer to Appendix "A" for removal and replacement instructions.

E. Wiring/Coaxial Cable

When repairing a wire that has broken from its terminal, remove all old solder and pieces of wire from the terminal, restrip the wire to the necessary length and resolder the wire to the terminal. Replace a damaged wire or coax with one of the same type, size and length.

5.3.4 DISASSEMBLY/ASSEMBLY PROCEDURES (See Figure 6-1 or 6-2, Section VI, Unit Final Assembly)

5.3.4.1 Disassembly of the KY 196/197 for Alignment

a. Disconnect power.

b. Remove top cover by removing screws.

c. Remove the screws that hold the receiver board in the chassis and fold the receiver board out for easy access to the coils and transformers.

5.3.4.2 Disassembly of the KY 196/197 for Service and Inspection

a. Perform steps a and c of paragraph 5.3.4.1.

b. Remove bottom cover by removing screws.

c. Remove cover over receiver by removing 4 screws and by gently prying at edges.

d. Remove 5 screws from the digital cover and lift off.

5.3.4.3 Assembly Procedure

The assembly procedure for the KY 196/197 is basically the reverse of the disassembly procedure. Be careful not to pinch any leads under metal parts when reassembling.

5.4 TROUBLESHOOTING THE KY 196/197

This section is intended for use as a guide in isolating malfunctions in a KY 196/197. The guidance presented here and the figures referenced by no means cover all causes of failure but are intended as a guide to locate the specific area of failure.

The troubleshooting flowchart, Figure 5-6, will help in locating sources of failure.

After troubleshooting procedures have been completed and the cause of the malfunction repaired, the unit should be checked and aligned using the procedures of 5.2.3.

5.4.1 TROUBLESHOOTING PROCEDURE

A. Power Supply

If the voltages below are not correct, compare them with the voltages in Table 5-1: This would help isolate a short circuit between supply outputs.

1. Verify 27.5 volts at each end of F101 (13.75V for KY 197)

2. Verify 10.0 volts at CR113 cathode.

3. Verify 5.0 volts at CR114 cathode.

4. Verify -26.0 volts at CR115 anode.

B. Local Oscillator

1. Verify that L.O. level is more than 1.5V p-p with oscilloscope on the 51 ohm resistor, R382. An oscilloscope with a vertical bandwidth greater than 140MHz is required or a diode detector in conjunction with a voltmeter will give approximate indication.

2. Verify that L.O. is 11.4MHz above desired frequency with counter.

C. Audio

With 100uv, 30% modulated at 1KHz in the audio output should be 100mw minimum with the volume control clockwise.

D. VCO Voltage

1. With the "use" frequency at 135.975MHz receive, the voltage at TP301 should be approximately 8.0 volts.
2. With the "use" frequency at 118.000MHz receive, the voltage at TP301 should be approximately 4.0 volts.
3. With the "use" frequency at 118.000MHz transmit, the voltage at TP301 should be approximately 2.5 volts.
4. With the "use" frequency at 126.50MHz receive, the voltage at TP301 should be approximately 6.00 volts.
5. The voltage at the cathodes of CR301, CR302, CR303 and CR304 should be near 6.00 volts at 236.5MHz.

E. AGC Amplifier

1. The voltage at TP303 is typically 5.51V with 100uv signal.
2. The voltage at TP304 is typically 4.83V with 100uv signal.
3. The voltage at TP304 is typically 7.54V with no RF input.

F. Detector

Verify approximately 2V p-p at TP302 with 100uv, 30% modulation at 1KHz.

G. Squelch Gate

Verify approximately 1V at pin 3, I301 with 100uv, 30% modulation at 1KHz.

H. Transmitter (connect to 50 ohm load)

1. Verify 60mw (typical) from transmitter buffer at E129.
2. Verify correct frequency at buffer output (E129).
3. Verify E602 at +8V.
4. Verify E601 at 11.0VDC (13.75VDC on KY 197).
5. Verify E605 at 10.0VDC (7.50VDC on KY 197).

I. Synthesizer Frequency

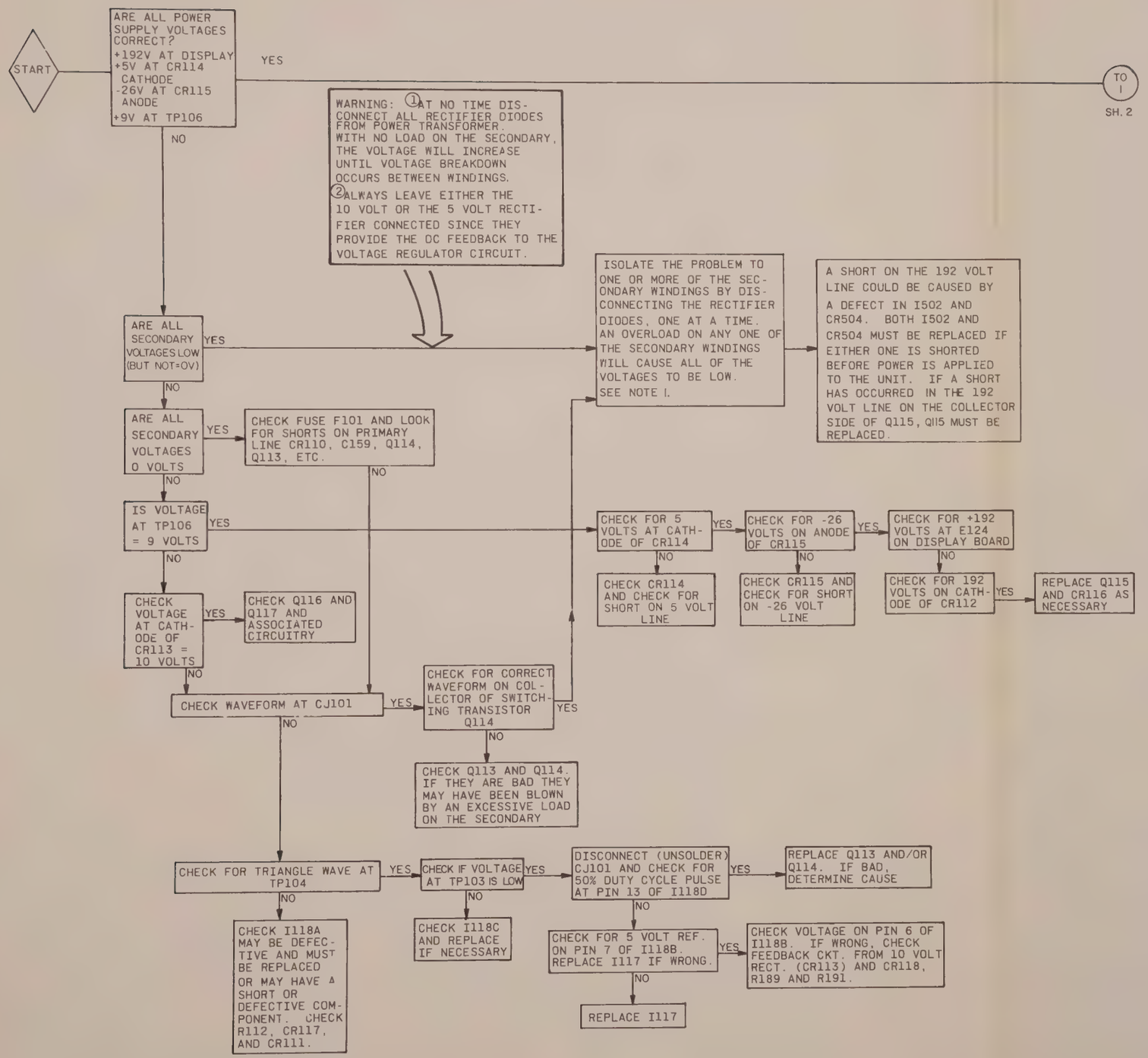
1. Verify correct switch code (see Section IV).
2. Verify reference frequency (25KHz square wave) at TP102.
3. Verify variable frequency (25KHz square wave) at TP101.

CONDITIONS	5 VOLT SUPPLY (V)	9 VOLT SUPPLY (V)	10 VOLT SUPPLY (V)	-26 VOLT SUPPLY (V)	192 VOLT SUPPLY (V)
5 volts to GND	0	1.64	2.32	-13.3	78.9
9 volts to GND	0.7	0	0	-14.7	52.0
10 volts to GND	0.2	0	0	-12.7	70.3
-26 volts to GND	3.1	5.8	6.7	0	162.8
192 volts to GND	0	0	0	-11.9	0
5 volts to 9 volts	5.5	5.5	5.5	-16.7	136.3
5 volts to 10 volts	5.5	4.7	5.5	-15.0	123.3
5 volts to -26 volts	0.7	2.3	3.0	0.7	98.7
5 volts to 192 volts	1.8	0.1	0	-12.2	1.8
9 volts to 10 volts	5.0	10.0	10.0	-23.5	179.8
9 volts to -26 volts	0.8	0.7	1.5	0.7	78.8
9 volts to 192 volts	0.3	4.7	1.1	-12.2	4.7
10 volts to -26 volts	0	0.2	0.2	0.8	0.8
10 volts to 192 volts	0	4.6	5.7	-10.4	5.5
-26 volts to 192 volts	0	0.2	0.1	0.8	0.8

WARNING

MEASURED UNDER VARIOUS SHORT CIRCUIT CONDITIONS

TABLE 5-1 POWER SUPPLY VOLTAGES


START
ARE ALL POWER SUPPLY VOLTAGES CORRECT?
+192V AT DISPLAY
+5V AT CR114 CATHODE
-26V AT CR115 ANODE
+9V AT TP106
YES
NO
TO 1
SH. 2
WARNING: ①AT NO TIME DISCONNECT ALL RECTIFIER DIODES FROM POWER TRANSFORMER. WITH NO LOAD ON THE SECONDARY, THE VOLTAGE WILL INCREASE UNTIL VOLTAGE BREAKDOWN OCCURS BETWEEN WINDINGS.
②ALWAYS LEAVE EITHER THE 10 VOLT OR THE 5 VOLT RECTIFIER CONNECTED SINCE THEY PROVIDE THE DC FEEDBACK TO THE VOLTAGE REGULATOR CIRCUIT.
ARE ALL SECONDARY VOLTAGES LOW (BUT NOT=0V)
YES
NO
ISOLATE THE PROBLEM TO ONE OR MORE OF THE SECONDARY WINDINGS BY DISCONNECTING THE RECTIFIER DIODES, ONE AT A TIME. AN OVERLOAD ON ANY ONE OF THE SECONDARY WINDINGS WILL CAUSE ALL OF THE VOLTAGES TO BE LOW. SEE NOTE 1.
A SHORT ON THE 192 VOLT LINE COULD BE CAUSED BY A DEFECT IN I502 AND CR504. BOTH I502 AND CR504 MUST BE REPLACED IF EITHER ONE IS SHORTED BEFORE POWER IS APPLIED TO THE UNIT. IF A SHORT HAS OCCURRED IN THE 192 VOLT LINE ON THE COLLECTOR SIDE OF Q115, Q115 MUST BE REPLACED.
ARE ALL SECONDARY VOLTAGES 0 VOLTS
YES
NO
CHECK FUSE F101 AND LOOK FOR SHORTS ON PRIMARY LINE CR110, C159, Q114, Q113, ETC.
NO
IS VOLTAGE AT TP106 = 9 VOLTS
YES
NO
CHECK FOR 5 VOLTS AT CATHODE OF CR114
YES
NO
CHECK CR114 AND CHECK FOR SHORT ON 5 VOLT LINE
CHECK FOR -26 VOLTS ON ANODE OF CR115
YES
NO
CHECK CR115 AND CHECK FOR SHORT ON -26 VOLT LINE
CHECK FOR +192 VOLTS AT E124 ON DISPLAY BOARD
NO
CHECK FOR 192 VOLTS ON CATHODE OF CR112
YES
REPLACE Q115 AND CR116 AS NECESSARY
CHECK VOLTAGE AT CATHODE OF CR113 = 10 VOLTS
YES
CHECK Q116 AND Q117 AND ASSOCIATED CIRCUITRY
NO
CHECK WAVEFORM AT CJ101
YES
CHECK FOR CORRECT WAVEFORM ON COLLECTOR OF SWITCHING TRANSISTOR Q114
YES
NO
CHECK Q113 AND Q114. IF THEY ARE BAD THEY MAY HAVE BEEN BLOWN BY AN EXCESSIVE LOAD ON THE SECONDARY
NO
CHECK FOR TRIANGLE WAVE AT TP104
YES
NO
CHECK I118A MAY BE DEFECTIVE AND MUST BE REPLACED OR MAY HAVE A SHORT OR DEFECTIVE COMPONENT. CHECK R112, CR117, AND CR111.
CHECK IF VOLTAGE AT TP103 IS LOW
YES
NO
CHECK I118C AND REPLACE IF NECESSARY
DISCONNECT (UNSOLDER) CJ101 AND CHECK FOR 50% DUTY CYCLE PULSE AT PIN 13 OF I118D
YES
REPLACE Q113 AND/OR Q114. IF BAD, DETERMINE CAUSE
NO
CHECK FOR 5 VOLT REF. ON PIN 7 OF I118B. REPLACE I117 IF WRONG.
YES
CHECK VOLTAGE ON PIN 6 OF I118B. IF WRONG, CHECK FEEDBACK CKT. FROM 10 VOLT RECT. (CR113) AND CR118, R189 AND R191.
NO
REPLACE I117

NOTES:

1. EXCESSIVE LOADING ON THE SECONDARY WILL CAUSE EXCESSIVE EMITTER CURRENT IN THE SWITCHING TRANSISTOR, Q114. IF THIS PRODUCES A VOLTAGE DROP ACROSS R205 THAT EXCEEDS THE REFERENCE LEVEL ON PIN 9 OF I118C, THE CURRENT LIMIT COMPARATOR I118C WILL FORCE THE INPUT OF THE PULSE MODULATOR (PIN 11 OF I118D) LOW, THUS REDUCING THE DRIVE TO THE SWITCHING TRANSISTORS. THIS CURRENT LIMITING OCCURS IN SHORT PULSES AND MAY BE THE EFFECT AND NOT THE CAUSE OF THE PROBLEM.

FIGURE 5-6 KY 196/197 TROUBLESHOOTING FLOWCHART
(Dwg. No. 696-5907-00, R-0)
(Sheet 1 of 5)

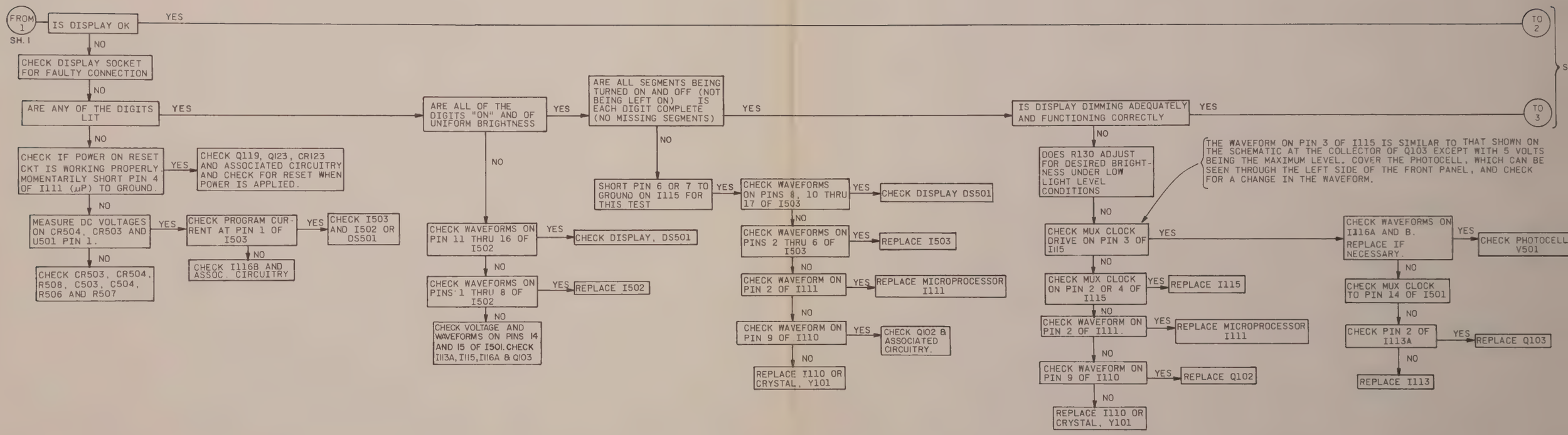

FROM 1 SH. 1
IS DISPLAY OK
YES
NO
TO 2
SH 2
CHECK DISPLAY SOCKET FOR FAULTY CONNECTION
NO
ARE ANY OF THE DIGITS LIT
YES
NO
ARE ALL OF THE DIGITS "ON" AND OF UNIFORM BRIGHTNESS
YES
NO
ARE ALL SEGMENTS BEING TURNED ON AND OFF (NOT BEING LEFT ON) IS EACH DIGIT COMPLETE (NO MISSING SEGMENTS)
YES
NO
IS DISPLAY DIMMING ADEQUATELY AND FUNCTIONING CORRECTLY
YES
TO 3
NO
CHECK IF POWER ON RESET CKT IS WORKING PROPERLY. MOMENTARILY SHORT PIN 4 OF I111 (μP) TO GROUND.
YES
CHECK Q119, Q123, CR123 AND ASSOCIATED CIRCUITRY AND CHECK FOR RESET WHEN POWER IS APPLIED.
NO
MEASURE DC VOLTAGES ON CR504, CR503 AND U501 PIN 1.
YES
CHECK PROGRAM CURRENT AT PIN 1 OF I503
YES
CHECK I503 AND I502 OR DS501
NO
CHECK I1168 AND ASSOC. CIRCUITRY
NO
CHECK CR503, CR504, R508, C503, C504, R506 AND R507
CHECK WAVEFORMS ON PIN 11 THRU 16 OF I502
YES
CHECK DISPLAY, DS501
NO
CHECK WAVEFORMS ON PINS 1 THRU 8 OF I502
YES
REPLACE I502
NO
CHECK VOLTAGE AND WAVEFORMS ON PINS 14 AND 15 OF I501. CHECK II13A, II15, II16A & Q103
SHORT PIN 6 OR 7 TO GROUND ON I115 FOR THIS TEST
YES
CHECK WAVEFORMS ON PINS 8, 10 THRU 17 OF I503
YES
CHECK DISPLAY DS501
NO
CHECK WAVEFORMS ON PINS 2 THRU 6 OF I503
YES
REPLACE I503
NO
CHECK WAVEFORM ON PIN 2 OF I111
YES
REPLACE MICROPROCESSOR I111
NO
CHECK WAVEFORM ON PIN 9 OF I110
YES
CHECK Q102 & ASSOCIATED CIRCUITRY.
NO
REPLACE I110 OR CRYSTAL, Y101
DOES R130 ADJUST FOR DESIRED BRIGHTNESS UNDER LOW LIGHT LEVEL CONDITIONS
NO
THE WAVEFORM ON PIN 3 OF I115 IS SIMILAR TO THAT SHOWN ON THE SCHEMATIC AT THE COLLECTOR OF Q103 EXCEPT WITH 5 VOLTS BEING THE MAXIMUM LEVEL. COVER THE PHOTOCELL, WHICH CAN BE SEEN THROUGH THE LEFT SIDE OF THE FRONT PANEL, AND CHECK FOR A CHANGE IN THE WAVEFORM.
CHECK MUX CLOCK DRIVE ON PIN 3 OF I115
YES
NO
CHECK MUX CLOCK ON PIN 2 OR 4 OF I115
YES
REPLACE I115
NO
CHECK WAVEFORM ON PIN 2 OF I111.
YES
REPLACE MICROPROCESSOR I111
NO
CHECK WAVEFORM ON PIN 9 OF I110
YES
REPLACE Q102
NO
REPLACE I110 OR CRYSTAL, Y101
CHECK WAVEFORMS ON I116A AND B. REPLACE IF NECESSARY.
YES
CHECK PHOTOCELL V501
NO
CHECK MUX CLOCK TO PIN 14 OF I501
NO
CHECK PIN 2 OF I113A
YES
REPLACE Q103
NO
REPLACE I113

FIGURE 5-6 KY 196/197 TROUBLESHOOTING FLOWCHART
(Sheet 2 of 5)

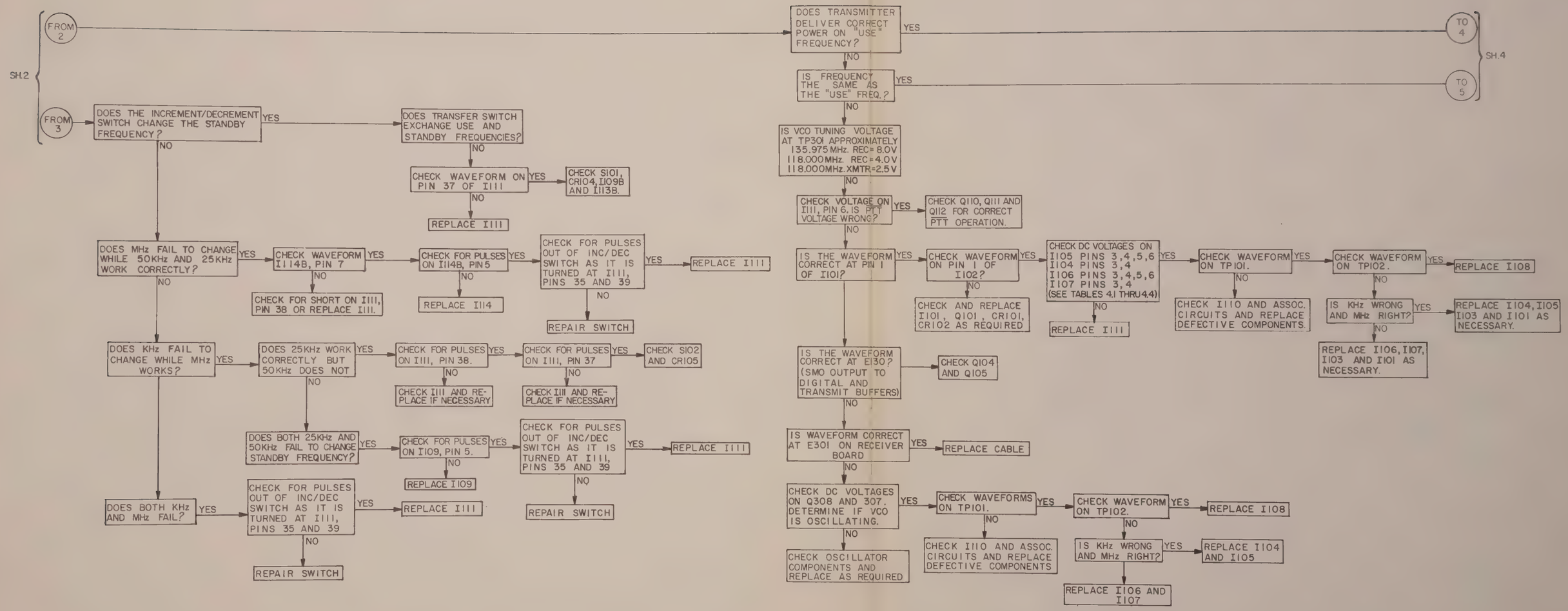


FIGURE 5-6 KY 196/197 TROUBLESHOOTING FLOWCHART
(Sheet 3 of 5)

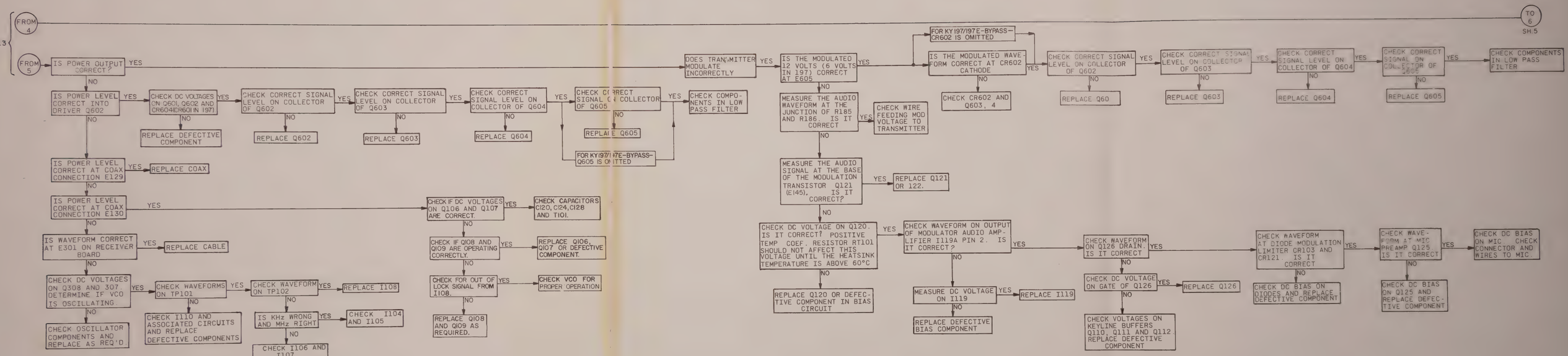

SH.3
FROM 4
FROM 5
IS POWER OUTPUT CORRECT?
YES
NO
IS POWER LEVEL CORRECT INTO DRIVER Q602
CHECK DC VOLTAGES ON Q601, Q602 AND CR604(CR601 IN 197)
REPLACE DEFECTIVE COMPONENT
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q602
REPLACE Q602
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q603
REPLACE Q603
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q604
REPLACE Q604
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q605
REPLACE Q605
FOR KY197/197E-BYPASS-Q605 IS OMITTED
CHECK COMPONENTS IN LOW PASS FILTER
IS POWER LEVEL CORRECT AT COAX CONNECTION E129
REPLACE COAX
IS POWER LEVEL CORRECT AT COAX CONNECTION E130
IS WAVEFORM CORRECT AT E301 ON RECEIVER BOARD
REPLACE CABLE
CHECK DC VOLTAGES ON Q308 AND 307. DETERMINE IF VCO IS OSCILLATING.
CHECK OSCILLATOR COMPONENTS AND REPLACE AS REQ'D.
CHECK WAVEFORMS ON TP101
CHECK I110 AND ASSOCIATED CIRCUITS AND REPLACE DEFECTIVE COMPONENTS
CHECK WAVEFORM ON TP102
REPLACE I108
IS KHz WRONG AND MHz RIGHT
CHECK I104 AND I105
CHECK I106 AND I107
CHECK IF DC VOLTAGES ON Q106 AND Q107 ARE CORRECT
CHECK CAPACITORS C120, C124, C128 AND T101.
CHECK IF Q108 AND Q109 ARE OPERATING CORRECTLY.
REPLACE Q106, Q107 OR DEFECTIVE COMPONENT.
CHECK FOR OUT OF LOCK SIGNAL FROM I108.
CHECK VCO FOR PROPER OPERATION
REPLACE Q108 AND Q109 AS REQUIRED.
DOES TRANSMITTER MODULATE INCORRECTLY
IS THE MODULATED 12 VOLTS (6 VOLTS IN 197) CORRECT AT E605
FOR KY197/197E-BYPASS-CR602 IS OMITTED
IS THE MODULATED WAVEFORM CORRECT AT CR602 CATHODE
CHECK CR602 AND Q603, 4
MEASURE THE AUDIO WAVEFORM AT THE JUNCTION OF R185 AND R186. IS IT CORRECT
CHECK WIRE FEEDING MOD VOLTAGE TO TRANSMITTER
MEASURE THE AUDIO SIGNAL AT THE BASE OF THE MODULATION TRANSISTOR Q121 (E145). IS IT CORRECT?
REPLACE Q121 OR 122.
CHECK DC VOLTAGE ON Q120. IS IT CORRECT? POSITIVE TEMP COEF. RESISTOR RT101 SHOULD NOT AFFECT THIS VOLTAGE UNTIL THE HEATSINK TEMPERATURE IS ABOVE 60°C
REPLACE Q120 OR DEFECTIVE COMPONENT IN BIAS CIRCUIT
CHECK WAVEFORM ON OUTPUT OF MODULATOR AUDIO AMPLIFIER I119A PIN 2. IS IT CORRECT?
MEASURE DC VOLTAGE ON I119
REPLACE I119
REPLACE DEFECTIVE BIAS COMPONENT
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q602
REPLACE Q60
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q603
REPLACE Q603
CHECK CORRECT SIGNAL LEVEL ON COLLECTOR OF Q604
REPLACE Q604
CHECK CORRECT SIGNAL ON COLLECTOR OF Q605
REPLACE Q605
CHECK COMPONENTS IN LOW PASS FILTER
CHECK WAVEFORM ON Q126 DRAIN. IS IT CORRECT
CHECK DC VOLTAGE ON GATE OF Q126
REPLACE Q126
CHECK VOLTAGES ON KEYLINE BUFFERS Q110, Q111 AND Q112. REPLACE DEFECTIVE COMPONENT
CHECK WAVEFORM AT DIODE MODULATION LIMITER CR103 AND CR121 IS IT CORRECT
CHECK DC BIAS ON DIODES AND REPLACE DEFECTIVE COMPONENT
CHECK WAVEFORM AT MIC PREAMP Q125 IS IT CORRECT
CHECK DC BIAS ON Q125 AND REPLACE DEFECTIVE COMPONENT
CHECK DC BIAS ON MIC. CHECK CONNECTOR AND WIRES TO MIC.
TO 6
SH.5

FIGURE 5-6 KY 196/197 TROUBLESHOOTING FLOWCHART
(Sheet 4 of 5)

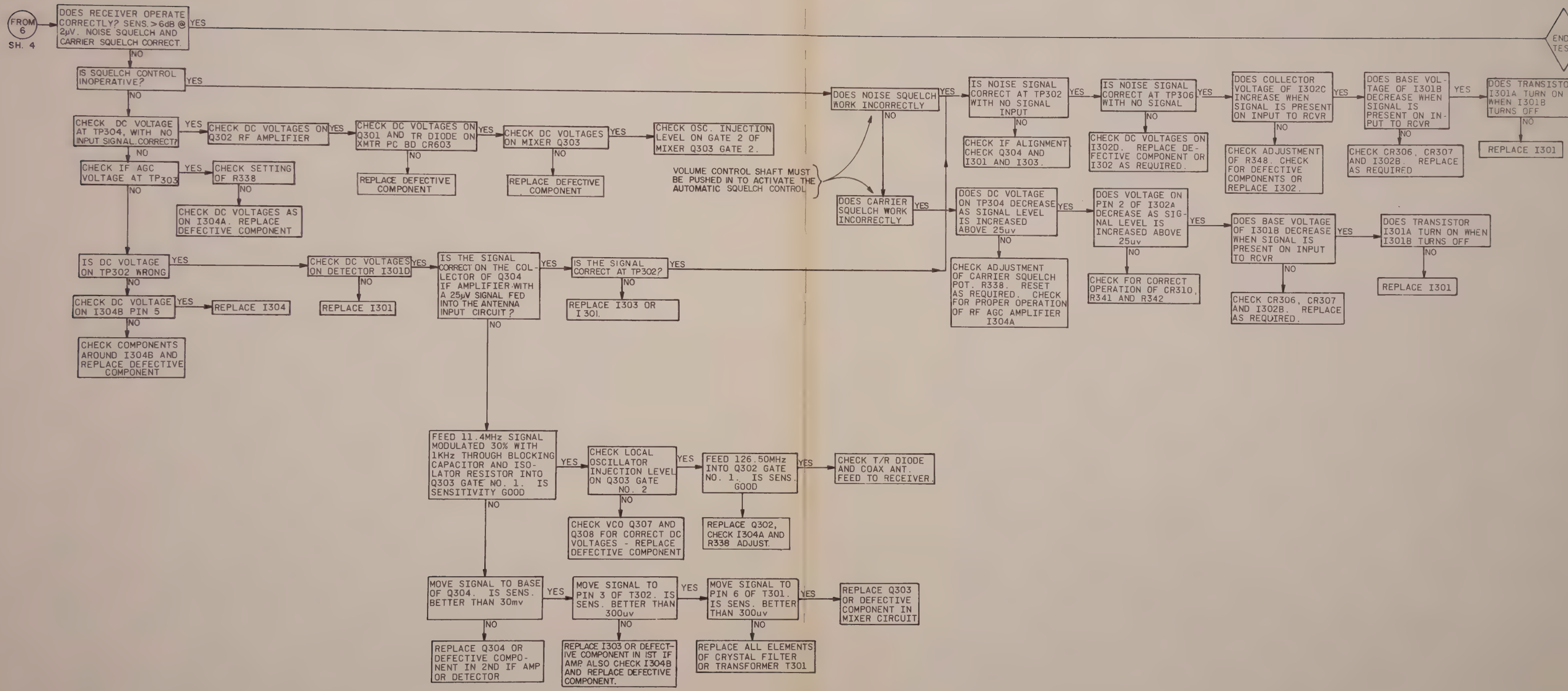

FROM 6 SH. 4
DOES RECEIVER OPERATE CORRECTLY? SENS. >6dB @ 2µV. NOISE SQUELCH AND CARRIER SQUELCH CORRECT.
YES
END TEST
NO
IS SQUELCH CONTROL INOPERATIVE?
YES
NO
CHECK DC VOLTAGE AT TP304, WITH NO INPUT SIGNAL. CORRECT?
YES
CHECK DC VOLTAGES ON Q302 RF AMPLIFIER
YES
CHECK DC VOLTAGES ON Q301 AND TR DIODE ON XMTR PC BD CR603
YES
CHECK DC VOLTAGES ON MIXER Q303
YES
CHECK OSC. INJECTION LEVEL ON GATE 2 OF MIXER Q303 GATE 2.
NO
REPLACE DEFECTIVE COMPONENT
NO
REPLACE DEFECTIVE COMPONENT
NO
CHECK IF AGC VOLTAGE AT TP303
YES
CHECK SETTING OF R338
NO
CHECK DC VOLTAGES AS ON I304A. REPLACE DEFECTIVE COMPONENT
NO
IS DC VOLTAGE ON TP302 WRONG
YES
CHECK DC VOLTAGES ON DETECTOR I301D
YES
IS THE SIGNAL CORRECT ON THE COLLECTOR OF Q304 IF AMPLIFIER WITH A 25µV SIGNAL FED INTO THE ANTENNA INPUT CIRCUIT?
YES
IS THE SIGNAL CORRECT AT TP302?
YES
NO
CHECK DC VOLTAGE ON I304B PIN 5
YES
REPLACE I304
NO
REPLACE I301
NO
REPLACE I303 OR I 301.
NO
CHECK COMPONENTS AROUND I304B AND REPLACE DEFECTIVE COMPONENT
NO
FEED 11.4MHz SIGNAL MODULATED 30% WITH 1KHz THROUGH BLOCKING CAPACITOR AND ISOLATOR RESISTOR INTO Q303 GATE NO. 1. IS SENSITIVITY GOOD
YES
CHECK LOCAL OSCILLATOR INJECTION LEVEL ON Q303 GATE NO. 2
YES
FEED 126.50MHz INTO Q302 GATE NO. 1. IS SENS. GOOD
YES
CHECK T/R DIODE AND COAX ANT. FEED TO RECEIVER.
NO
CHECK VCO Q307 AND Q308 FOR CORRECT DC VOLTAGES - REPLACE DEFECTIVE COMPONENT
NO
REPLACE Q302, CHECK I304A AND R338 ADJUST.
NO
MOVE SIGNAL TO BASE OF Q304. IS SENS. BETTER THAN 30mv
YES
MOVE SIGNAL TO PIN 3 OF T302. IS SENS. BETTER THAN 300uv
YES
MOVE SIGNAL TO PIN 6 OF T301. IS SENS. BETTER THAN 300uv
YES
REPLACE Q303 OR DEFECTIVE COMPONENT IN MIXER CIRCUIT
NO
REPLACE Q304 OR DEFECTIVE COMPONENT IN 2ND IF AMP OR DETECTOR
NO
REPLACE I303 OR DEFECTIVE COMPONENT IN 1ST IF AMP ALSO CHECK I304B AND REPLACE DEFECTIVE COMPONENT.
NO
REPLACE ALL ELEMENTS OF CRYSTAL FILTER OR TRANSFORMER T301
DOES NOISE SQUELCH WORK INCORRECTLY
YES
NO
VOLUME CONTROL SHAFT MUST BE PUSHED IN TO ACTIVATE THE AUTOMATIC SQUELCH CONTROL
DOES CARRIER SQUELCH WORK INCORRECTLY
YES
IS NOISE SIGNAL CORRECT AT TP302 WITH NO SIGNAL INPUT
YES
NO
CHECK IF ALIGNMENT CHECK Q304 AND I301 AND I303.
IS NOISE SIGNAL CORRECT AT TP306 WITH NO SIGNAL
YES
NO
CHECK DC VOLTAGES ON I302D. REPLACE DEFECTIVE COMPONENT OR I302 AS REQUIRED.
DOES COLLECTOR VOLTAGE OF I302C INCREASE WHEN SIGNAL IS PRESENT ON INPUT TO RCVR
YES
NO
CHECK ADJUSTMENT OF R348. CHECK FOR DEFECTIVE COMPONENTS OR REPLACE I302.
DOES BASE VOLTAGE OF I301B DECREASE WHEN SIGNAL IS PRESENT ON INPUT TO RCVR
YES
NO
CHECK CR306, CR307 AND I302B. REPLACE AS REQUIRED
DOES TRANSISTOR I301A TURN ON WHEN I301B TURNS OFF
NO
REPLACE I301
DOES DC VOLTAGE ON TP304 DECREASE AS SIGNAL LEVEL IS INCREASED ABOVE 25uv
YES
NO
CHECK ADJUSTMENT OF CARRIER SQUELCH POT. R338. RESET AS REQUIRED. CHECK FOR PROPER OPERATION OF RF AGC AMPLIFIER I304A
DOES VOLTAGE ON PIN 2 OF I302A DECREASE AS SIGNAL LEVEL IS INCREASED ABOVE 25uv
YES
NO
CHECK FOR CORRECT OPERATION OF CR310, R341 AND R342
DOES BASE VOLTAGE OF I301B DECREASE WHEN SIGNAL IS PRESENT ON INPUT TO RCVR
YES
NO
CHECK CR306, CR307 AND I302B. REPLACE AS REQUIRED.
DOES TRANSISTOR I301A TURN ON WHEN I301B TURNS OFF
NO
REPLACE I301

FIGURE 5-6 KY 196/197 TROUBLESHOOTING FLOWCHART
(Sheet 5 of 5)

KPN 006-3001-08

Manufactured By
KING
PRINTING DIVISION

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NAME	ASS'Y. NO.
COMM Transceiver	064-1019-00/01

KING RADIO CORP. PARTS LISTING

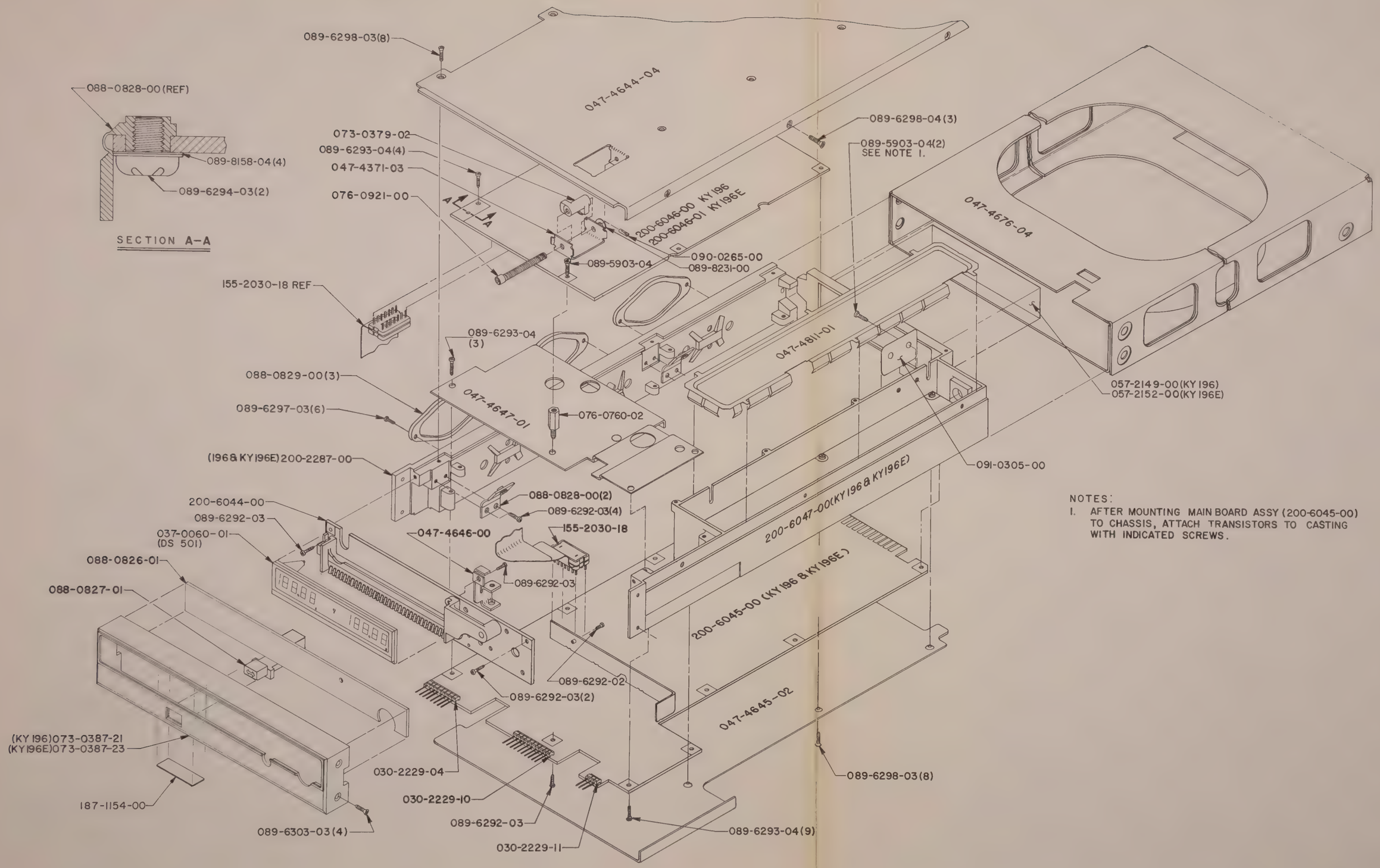
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	064-1019-00	COMM Transceiver(KY 196)		X				
	064-1019-01	COMM Transceiver(KY 196E)			X			
	007-0230-05	Tstr D44H8		1	1			
Q114	007-0205-00	Tstr D45C2		1	1			
	013-0006-01	Ferrite Bead		2	2			
L114	013-0006-01	Ferrite Bead		-	-			
L115								
	016-1131-00	Adhesive		AR	AR			
	025-0005-02	Wire 18 AWG Red		1.0	1.0			
	025-0005-12	Wire 18 AWG Red/Wht		1.0	1.0			
	025-0018-44	Wire 26 AWG Yel		0.8	0.8			
	026-0013-00	Coax Cable RG178B/U		1.0	1.0			
	026-0004-00	Wire Tinned Copper #20		AR	AR			
	030-2229-04	Rt Angle Header		1	1			
	030-2229-10	Rt Angle Header		1	1			
	030-2229-11	Rt Angle Header		1	1			
DS501	037-0060-01	Display		1	1			
	047-4371-03	Spreader		1	1			
	047-4644-04	Top Cover		1	1			
	047-4645-02	Bottom Cover		1	1			
	047-4646-00	Bracket		1	1			
	047-4647-01	Digital Cover		1	1			
	047-4676-04	Mounting Rack		1	1			
	047-4811-01	Xmitter Cover		1	1			
	057-2149-00	Serial Number Tag		1	0			
	057-2152-00	Serial Number Tag		0	1			
	073-0379-02	Hold Down		1	1			
	073-0387-21	Front Panel		1	0			
	073-0387-23	Front Panel		0	1			
	076-0760-02	Spacer		1	1			
	076-0921-00	Screw		1	1			
	088-0826-01	Lens		1	1			
	088-0827-01	Pushbutton		1	1			
	088-0828-00	Hinge		2	2			
	088-0829-00	Cover		3	3			

NAME	ASS'Y. NO.
COMM Transceiver	064-1019-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	089-5903-04	Screw PH 4-40 x ¼		4	4			
	089-6292-02	Screw PH 2-56 x 1/8		1	1			
	089-6292-03	Screw PH 2-56 x 3/16		8	8			
	089-6293-04	Screw PH 3-48 x ¼		16	16			
	089-6294-02	Screw PH 4-40 x 1/8		2	2			
	089-6298-03	Screw FH 3-48 x 3/16		16	16			
	089-6298-04	Screw FH 3-48 x ¼		7	7			
	089-8231-00	Washer		1	1			
	090-0265-00	Pin		1	1			
	091-0305-00	Insulator TSTR		1	1			
	150-0049-10	Tubing, Shrinkable Natural		AR	AR			
	155-2030-18	Jumper Cable		1	1			
	200-2287-00	Mod Heatsink Assy		1	1			
	200-6044-00	Display Bd		1	1			
	200-6045-00	Main Bd		1	1			
	200-6046-00	Receiver Bd		1	0			
	200-6046-01	Receiver Bd		0	1			
	200-6047-00	Transmitter Bd.		1	1			

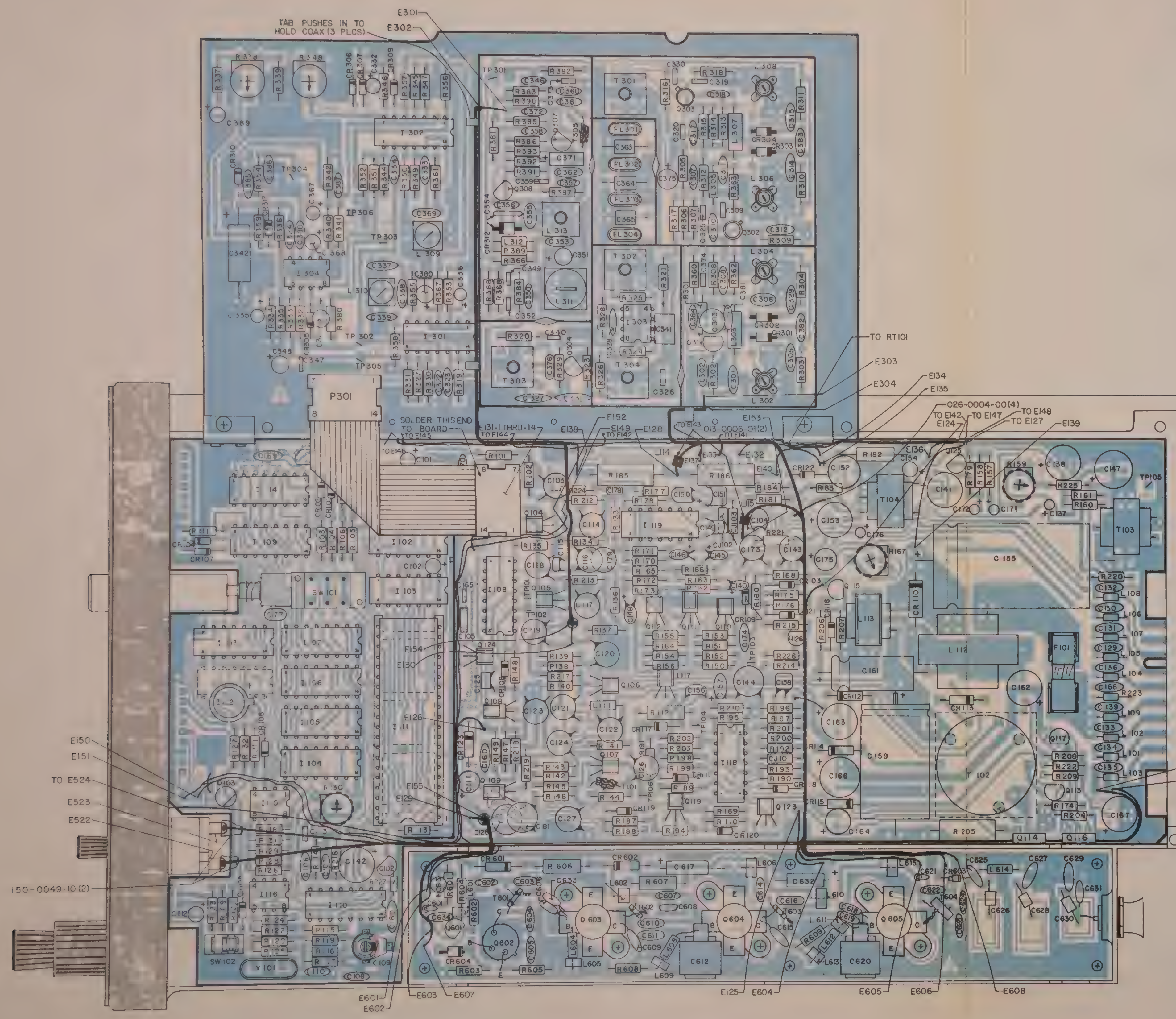
PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME COMM Transceiver				ASS'Y. NO. 064-1019-00/01
ASS'Y. DWG. 300-2371-00		UNIT KY 196/196E		USED ON 000-0244-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1 2				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978



NOTES:
1. AFTER MOUNTING MAIN BOARD ASSY (200-6045-00) TO CHASSIS, ATTACH TRANSISTORS TO CASTING WITH INDICATED SCREWS.

FIGURE 6-1 KY 196/196E COMMUNICATIONS TRANSCEIVER FINAL ASSEMBLY
(Dwg. No. 300-2371-00, R-0)
(Sheet 1 of 2)

(KY
(KY



FROM	TO	DESCRIPTION	KPN	LENGTH	SEE NOTE
E122	E522	18AWG RED	025-0005-02	10"	
E123	E523	18AWG RED/WHT	025-0005-12	10"	
E124	E524	26AWG YEL	025-0018-44	9.5"	
E125	E604	20AWG BLK	025-0004-00	1.5"	2
E126	E602	26AWG GRY/WHT	025-0018-89	3.25"	2
E127	E140	20AWG TINNED COPPER	026-0004-00	2.50"	1
E138	E146	20AWG TINNED COPPER	026-0004-00	2 30"	1
E128	E605	20AWG ORN/WHT	025-0004 13	7.5"	2
E139	E147	20AWG TINNED COPPER	026-0004-00	1 65"	1
E129 E155	E603 E607	COAX CABLE RG 178 B/U	026-0013-00	2.75"	2
E130 E154	E301 E302	COAX CABLE RG 178 B/U	026-0013-00	8.75"	
E131-1/14	P301	JUMPER CABLE	155-2030-18	3.55"	
E142	E144	20AWG TINNED COPPER	026-0004-00	1.25"	1
E132	E142	20AWG TINNED COPPER	026-0004-00	1 20"	1
E145	E148	20AWG TINNED COPPER	026-0004-00	5.75"	1
E133	E141	20AWG TINNED COPPER	026-0004-00	.80"	1
E149	E150	26AWG GRN	025-0018-55	7"	3
E134	RT101	POSISTOR 470 OHM	134-1027-00		4
E135	RT101	POSISTOR 470 OHM	134-1027-00		4
E136	E148	20AWG TINNED COPPER	026-0004-00	1.40"	1
E151	E152	26AWG GRN/BLK	025-0018-50	7"	3
E[illegible]	E143	20AWG TINNED COPPER	026-0004-00	.50"	1
E153	E601	20AWG ORN	025-0004-03	9.25"	2
E303 E304	E606 E608	COAX CABLE RG 178 B/U	026-0013-00	11"	2

NOTES:

1. REQUIRES 20 NAT. TEFLON TUBING 150-0005-10. THESE ITEMS ARE PART OF 200-2287-00.
2. THESE ITEMS ARE PART OF 200-6047-00.
3. THESE ITEMS ARE PART OF 200-6045-00.
4. THESE ITEMS ARE PART OF 200-2287-00. THEY REQUIRE 22 NAT. TEFLON TUBING 150-0004-10.

FIGURE 6-1 KY 196/196E COMMUNICATIONS TRANSCEIVER FINAL ASSEMBLY
(Dwg. No. 300-2371-00, R-0)
(Sheet 2 of 2)

NAME	ASS'Y. NO.
COMM TRANSCEIVER	064-1021-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	064-1021-00	COMM Transceiver (KY 197)		X				
	064-1021-01	COMM Transceiver (KY 197E)			X			
	016-1131-00	Adhesive		AR	AR			
	025-0005-02	Wire 18 AWG Red		1.0	1.0			
	025-0005-12	Wire 18 AWG Red/Wht		1.0	1.0			
	026-0018-44	Wire 26 AWG Yel		0.8	0.8			
	026-0013-00	Coax Cable RG178B/U		1.0	1.0			
	026-0004-00	Wire Tinned Copper #20		AR	AR			
	030-2229-04	Rt Angle Header		1	1			
	030-2229-10	Rt Angle Header		1	1			
	030-2229-11	Rt Angle Header		1	1			
	047-4371-03	Spreader		1	1			
	047-4644-04	Top Cover		1	1			
	047-4645-02	Bottom Cover		1	1			
	047-4646-00	Bracket		1	1			
	047-4647-01	Digital Cover		1	1			
	047-4676-04	Mounting Rack		1	1			
	047-4811-01	Xmitter Cover		1	1			
	057-2179-00	Serial Number Tag		1	0			
	057-2180-00	Serial Number Tag		0	1			
	073-0379-02	Hold Down		1	1			
	073-0387-22	Front Panel		1	0			
	073-0387-24	Front Panel		0	1			
	076-0760-02	Spacer		1	1			
	076-0921-00	Screw		1	1			
	088-0826-01	Lens		1	1			
	088-0827-01	Pushbutton		1	1			
	088-0828-00	Hinge		2	2			
	088-0829-00	Cover		3	3			

NAME	ASS'Y. NO.
COMM Transceiver	064-1021-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	089-5903-04	Screw PH 4-40 x 1/4		4	4			
	089-6292-02	Screw PH 2-56 x 1/8		1	1			
	089-6292-03	Screw PH 2-56 x 3/16		8	8			
	089-6293-04	Screw PH 3-48 x 1/4		16	16			
	089-6294-02	Screw PH 4-40 x 1/8		2	2			
	089-6298-03	Screw FH 3-48 x 3/16		16	16			
	089-6298-04	Screw FH 3-48 x 1/4		7	7			
	089-8231-00	Washer		1	1			
	090-0265-00	Pin		1	1			
	091-0305-00	Insulator TSTR		1	1			
	150-0049-10	Tubing, Shrink Natural		AR	AR			
	155-2030-18	Jumper Cable		1	1			
	200-2287-01	Mod Heatsink Assy		1	1			
	200-6044-00	Display Bd		1	1			
	200-6045-01	Main Bd		1	1			
	200-6046-00	Receiver Bd		1	0			
	200-6046-01	Receiver Bd		0	1			
	200-6166-00	Transmitter Bd		1	1			
Q114	007-0230-05	TSTR D44H8		1	1			
Q116	007-0205-00	TSTR D45C2		1	1			
L114	013-0006-01	Ferrite Bead		2	2			
L115	013-0006-01	Ferrite Bead		-	-			
DS 501	037-0060-01	Display		1	1			

PARTS LIST REVISION HISTORY				ENGR. APPROVAL Roger Manning
NAME COMM Transceiver				ASS'Y. NO. 064-1021-00/01
ASS'Y. DWG. 300-2371-01		UNIT KY 197/197E		USED ON 000-0262-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978

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FIGURE 6-2 KY 197/197E COMMUNICATIONS TRANSCEIVER FINAL ASSEMBLY
(Dwg. No. 300-2371-01, R-0)
(Sheet 1 of 2)

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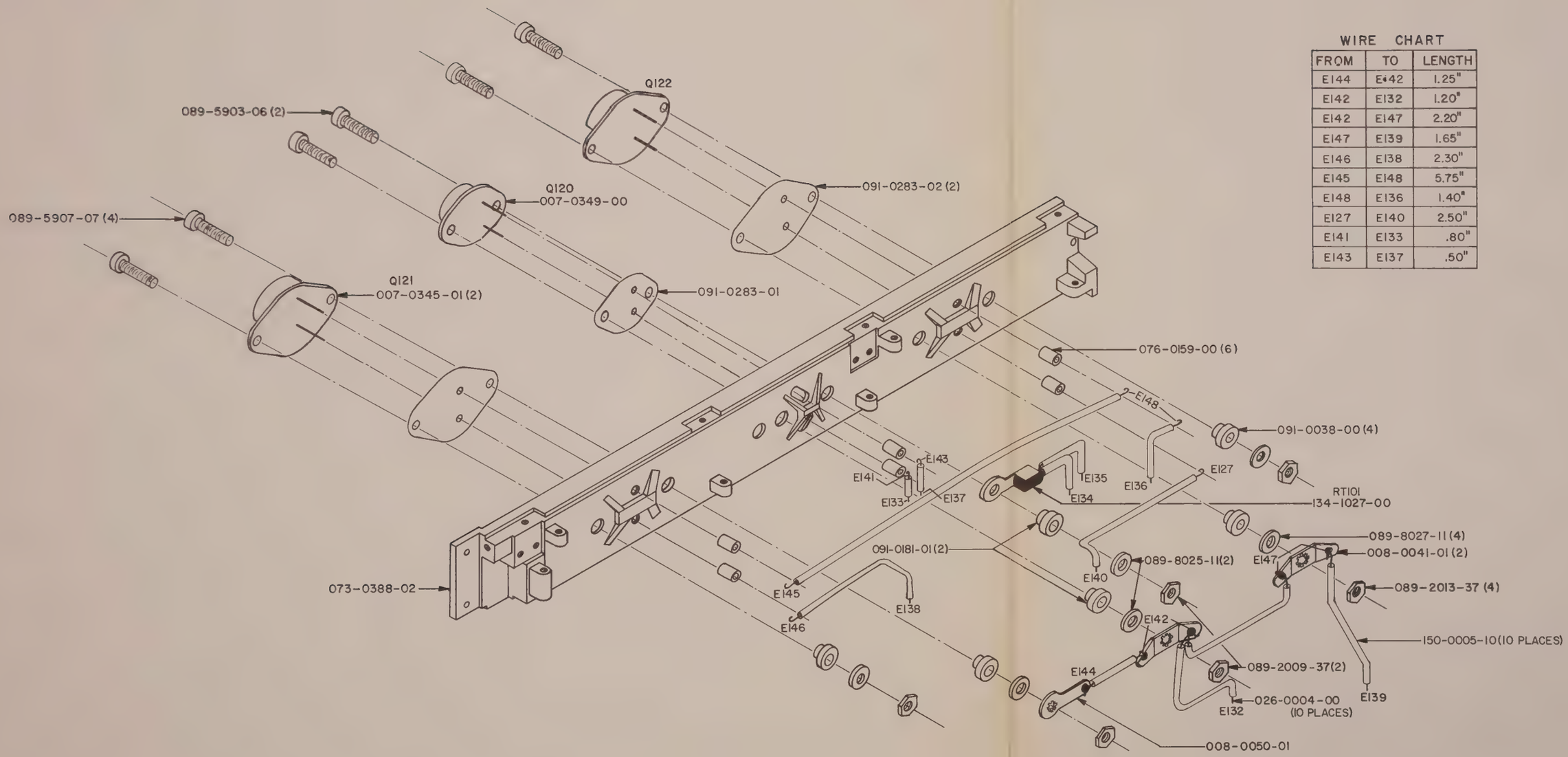
FIGURE 6-2 KY 197/197E COMMUNICATIONS TRANSCEIVER FINAL ASSEMBLY
(Sheet 2 of 2)

NAME	ASS'Y. NO.
Modulator Heatsink Assembly	200-2287-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	008-0041-01	Solder Lug		1	1			
	008-0050-01	Solder Lug		2	2			
	026-0004-00	Wire #20 Tinned Copper		1.7	1.7			
	073-0388-02	Mod Heatsink		1	1			
	076-0159-00	Lead Insulator		6	6			
	089-2009-37	Nut 4-40		2	2			
	089-2013-37	Nut 6-32		4	4			
	089-5903-06	Screw PHP 4-40x 3/8		2	2			
	089-5907-07	Screw PHP 6-32 x 7/16		4	4			
	089-8027-11	Flat Washer 4-40		4	4			
	089-8025-11	Flat Washer 4-40		2	2			
	091-0181-01	Bushing		2	2			
	091-0283-02	Insulator Tstr (TO-3)		2	2			
	091-0038-00	Washer		4	4			
	091-0283-01	Insulator Tstr (TO-66)		1	1			
	150-0005-10	Tubing Teflon #20 Nat.		1.0	1.0			
Q120	007-0349-00	Tstr 2N6301		1	1			
Q121	007-0345-01	Tstr 2N6058		2	0			
Q121	007-0364-00	Tstr 2N3055		0	1			
Q122	007-0345-01	Tstr 2N6058		2	0			
Q122	007-0365-00	Tstr 2N5879		0	1			
RT101	134-1027-00	Posistor 470 Ohm		1	1			

PARTS LIST REVISION HISTORY				ENGR. APPROVAL R L Manning
NAME Modulator Heatsink Assembly				ASS'Y. NO. 200-2287-00
ASS'Y. DWG. 300-2287-00			UNIT KY 196/196E KY 197/197E	USED ON 064-1019-00/01 064-1021-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978



WIRE CHART

FROM	TO	LENGTH
E144	E142	1.25"
E142	E132	1.20"
E142	E147	2.20"
E147	E139	1.65"
E146	E138	2.30"
E145	E148	5.75"
E148	E136	1.40"
E127	E140	2.50"
E141	E133	.80"
E143	E137	.50"

FIGURE 6-3 KY 196/196E MODULATOR HEATSINK ASSEMBLY
(Dwg. No 300-2287-00, R-0)

WIRE CHART

FROM	TO	LENGTH
E145	E136	6.00"
E146	E147	5.15"
E147	E156	2.85"
E144	E148	4.90"
E127	E139	1.95"
E127	E142	3.45"
E142	E132	1.80"
E141	E133	.80"
E143	E137	.50"

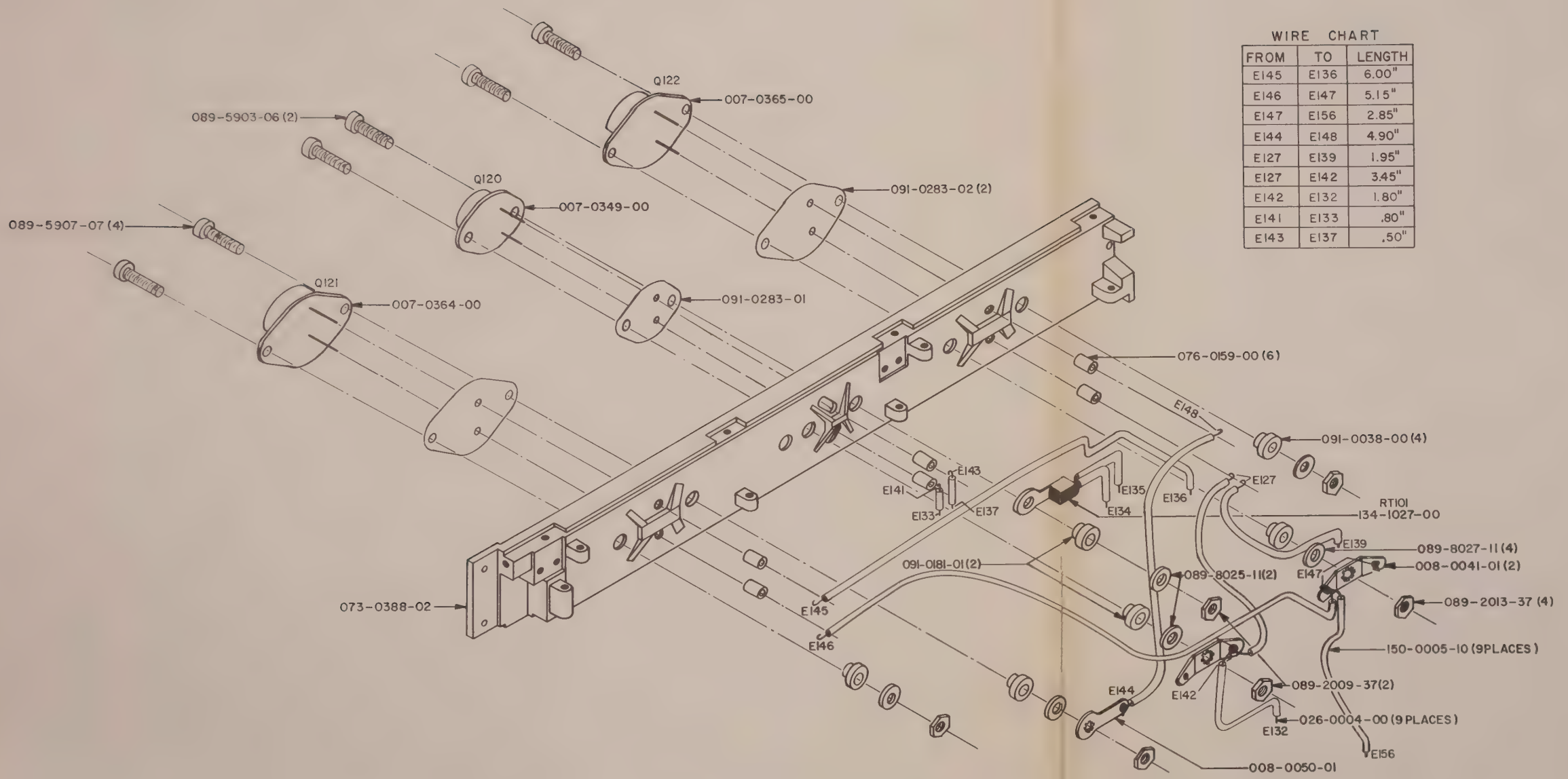


FIGURE 6-4 KY 197/197E MODULATOR HEATSINK ASSEMBLY
(Dwg. No. 300-2287-01, R-0)

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
		Used On						
	200-6045-00	Main Board(KY 196/196E)		X				
	200-6045-01	Main Board(KY 197/197E)			X			
	008-0011-01	Terminal		2	2			
	009-6045-00	Main PC Board		1	1			
	012-1142-00	Insulator		1	1			
	016-1040-00	Post Coating		AR	AR			
	025-0018-50	Wire 26 AWG Green/Black		AR	AR			
	025-0018-55	Wire 26 AWG Green		AR	AR			
	026-0002-00	Wire Tinned Copper #24		AR	AR			
	026-0004-00	Wire Tinned Copper #20		AR	AR			
	033-0069-02	Socket 40 Pin		1	1			
	047-4648-01	Digital Fence		1	1			
	047-4652-01	Regulator Shield		1	1			
	047-4655-01	Xfmr Bracket		1	1			
	090-0213-00	Fuse Clip		2	2			
	091-0196-00	Standoff Bead		3	3			
	150-0017-10	Shrinkable Tubing #24		AR	AR			
Q101	007-0238-00	Tstr FPN4917		4	4			
Q102	007-0078-00	Tstr 2N3415		6	6			
Q103	007-0078-00	Tstr 2N3415		-	-			
Q104	007-0195-00	Tstr MPSH10		4	4			
Q105	007-0195-00	Tstr MPSH10		-	-			
Q106	007-0195-00	Tstr MPSH10		-	-			
Q107	007-0195-00	Tstr MPSH10		-	-			
Q108	007-0078-00	Tstr 2N3415		-	-			
Q109	007-0078-00	Tstr 2N3415		-	-			
Q110	007-0238-00	Tstr FPN4917		-	-			
Q111	007-0078-00	Tstr 2N3415		-	-			
Q112	007-0238-00	Tstr FPN4917		-	-			
Q113	007-0243-00	Tstr MPSA06		1	1			
Q114		Used on 064-1019/1021-00/01						
Q115	007-0254-00	Tstr MPSA92		1	1			
Q116		Used on 064-1019/1021-00/01						
Q117	007-0260-00	Tstr MPSA18		1	1			
Q118	NOT USED							

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
Q119	007-0078-01	Tstr 2N3417		1	1			
Q120	Used on 200-2287-00							
Q121	Used on 200-2287-00							
Q122	Used on 200-2287-00							
Q123	007-0238-00	Tstr FPN4917		-	-			
*Q124	007-0238-00	Tstr FPN4917		0	0			
Q125	007-0078-00	Tstr 2N3415		-	-			
Q126	007-0280-01	Tstr E175		1	1			
*This part is not used in the standard PC Board								
CR101	007-6016-00	Diode 1N4154		11	11			
CR102	007-6016-00	Diode 1N4154		-	-			
CR103	007-6016-00	Diode 1N4154		-	-			
CR104	007-6016-00	Diode 1N4154		-	-			
CR105	007-6016-00	Diode 1N4154		-	-			
CR106	007-6016-00	Diode 1N4154		-	-			
CR107	007-6016-00	Diode 1N4154		-	-			
CR108	007-6016-00	Diode 1N4154		-	-			
CR109	007-6105-00	Diode FDH444		4	3			
CR110	007-5039-00	Diode Zen 39V		1	1			
CR111	007-6016-00	Diode 1N4154		-	-			
CR112	007-6091-04	Diode MR818		1	1			
CR113	007-6091-02	Diode MR811		1	1			
CR114	007-6091-01	Diode MR810		1	1			
CR115	007-6025-00	Diode 1N4003		1	1			
CR116	007-6106-00	Diode 1N4156		1	2			
CR117	007-5011-24	Diode Zen 33V		1	1			
CR118	007-6016-00	Diode 1N4154		-	-			
CR119	007-6105-00	Diode FDH444		-	-			
CR120	007-6105-00	Diode FDH444		-	0			
CR120	007-6016-00	Diode 1N4156		0	-			
CR121	007-6016-00	Diode 1N4154		-	-			
CR122	007-6105-00	Diode FDH444		-	-			
CR123	007-6023-00	Diode 1N277		1	1			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
TP101	008-0096-01	Test Point		6	6			
TP102	008-0096-01	Test Point		-	-			
TP103	008-0096-01	Test Point		-	-			
TP104	008-0096-01	Test Point		-	-			
TP105	008-0096-01	Test Point		-	-			
TP106	008-0096-01	Test Point		-	-			
L101	013-0006-03	Ferrite Bead		8	8			
L102	013-0006-03	Ferrite Bead		-	0			
L103	013-0006-03	Ferrite Bead		-	-			
L104	013-0006-03	Ferrite Bead		-	-			
L105	013-0006-03	Ferrite Bead		-	-			
L106	013-0006-03	Ferrite Bead		-	-			
L107	013-0006-03	Ferrite Bead		-	-			
L108	013-0006-03	Ferrite Bead		-	-			
L109	013-0006-03	Ferrite Bead		0	-			
L110	NOT USED							
L111	019-2084-01	Choke .15uh 10%		1	1			
L112	019-2209-00	Inductor 1mH		1	1			
L113	019-2279-00	Inductor 250uh		1	1			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
T101	019-3082-00	Xfmr RF		1	1			
T102	019-6019-00	Xfmr Switching Reg.		1	1			
T103	019-5083-00	Xfmr Audio Out		1	1			
T104	019-5084-00	Xfmr Modulation		1	1			
CJ101	026-0018-00	Circuit Jumper		2	2			
CJ102	026-0018-00	Circuit Jumper		-	0			
CJ103	026-0018-00	Circuit Jumper		0	-			
SW101	031-0357-02	Switch Change Reg		1	1			
SW102	031-0343-00	Switch 25/50KHz		1	1			
F101	036-0058-05	Fuse 6A 32V		1	1			
Y101	044-0053-05	Crystal 3.2MHz		1	1			
C101	096-1082-47	Cap T 1uf 20V		8	8			
C102	096-1082-47	Cap T 1uf 20V		-	-			
C103	113-3100-01	Cap D/C 10pf		4	4			
C104	096-1082-05	Cap T 10uf 20V 10%		3	3			
C105	111-0001-13	Cap MC .1uf		5	4			
C106	113-3330-00	Cap D/C 33pf		1	1			
C107	113-3150-00	Cap D/C 15pf		3	3			
C108	113-3150-00	Cap D/C 15pf N150		-	-			
C109	102-0029-00	Cap Vari 2.7-20pf N470		1	1			
C110	113-5331-00	Cap D/C 330pf		1	1			
C111	096-1082-05	Cap T 10uf 20V 10%		-	-			
C112	096-1082-47	Cap T 1uf 20V		-	-			
C113	111-0001-00	Cap MC .01uf		3	3			
C114	113-3221-00	Cap D/C 220pf		22	22			
C115	111-0001-00	Cap MC .01uf		-	-			
C116	113-3221-00	Cap D/C 220pf		-	-			
C117	113-3221-00	Cap D/C 220pf		-	-			
C118	113-3100-01	Cap D/C 10pf		-	-			
C119	113-5022-00	Cap D/C 2.2pf		1	1			
C120	113-3100-01	Cap D/C 10pf		-	-			
C121	113-3221-00	Cap D/C 220pf		-	-			
C122	113-3221-00	Cap D/C 220pf		-	-			
C123	113-3221-00	Cap D/C 220pf		-	-			
C124	113-3150-00	Cap D/C 15pf		-	-			
C125	111-0001-13	Cap MC .1uf		-	-			
C126	113-3221-00	Cap D/C 220pf		-	-			
C127	113-5301-00	Cap D/C 300pf		1	1			
C128	113-3390-00	Cap D/C 39pf		1	1			
C129	113-3221-00	Cap D/C 220pf		-	-			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C130	113-3221-00	Cap D/C 220pf		-	-			
C131	113-3221-00	Cap D/C 220pf		-	-			
C132	113-3221-00	Cap D/C 220pf		-	-			
C133	113-3221-00	Cap D/C 220pf		-	0			
C134	113-3221-00	Cap D/C 220pf		-	-			
C135	113-3221-00	Cap D/C 220pf		-	-			
C136	113-3221-00	Cap D/C 220pf		-	-			
C137	096-1082-47	Cap T 1uf 20V		-	-			
C138	096-1082-08	Cap T 100uf 15V		3	3			
C139	113-3221-00	Cap D/C 220pf		0	-			
C140	096-1082-12	Cap T 3.3uf 15V 10%		1	1			
C141	097-0068-16	Cap AL 150uf 35V		3	3			
C142	096-1082-01	Cap T 220uf 10V		2	2			
C143	113-3221-00	Cap D/C 220pf		-	-			
C144	113-5102-00	Cap D/C 1000pf		2	2			
C145	096-1082-14	Cap T 0.68uf 20V 5%		1	1			
C146	096-1082-13	Cap T 0.33uf 20V 5%		1	1			
C147	097-0068-16	Cap AL 150uf 35V		-	-			
C148	096-1082-47	Cap T 1uf 20V		-	-			
C149	111-0001-13	Cap MC .1uf		-	-			
C150	096-1082-47	Cap T 1uf 20V		-	-			
C151	111-0001-02	Cap MC .015uf		1	1			
C152	096-1082-28	Cap T 47uf 20V		1	1			
C153	097-0068-16	Cap AL 150uf 35V		-	-			
C154	096-1082-33	Cap T .47uf 50V		1	1			
C155	097-0072-00	Cap AL 1000uf 50V		1	0			
C155	097-0070-04	Cap AL 2200uf 25V		0	1			
C156	111-0001-13	Cap MC .1uf		-	-			
C157	096-1082-47	Cap T 1uf 20V		-	-			
C158	111-0001-34	Cap MC 1500pf 50V 5%		1	1			
C159	097-0057-37	Cap AL 680uf 40V		1	1			
C160	113-3221-00	Cap D/C 220pf		-	-			
C161	097-0074-03	Cap AL 2uf 350V		1	1			
C162	096-1082-07	Cap T 68uf 20V		1	1			
C163	096-1082-01	Cap T 220uf 10V		-	-			
C164	097-0068-22	Cap AL 4.7uf 50V		1	1			
C165	111-0001-00	Cap MC .01uf		-	-			
C166	096-1082-08	Cap T 100uf 15V 20%		-	-			
C167	096-1082-08	Cap T 100uf 15V		-	-			
C168	113-3221-00	Cap D/C 220pf		-	-			
C169	113-3100-01	Cap D/C 10pf		-	-			
C170	113-5471-00	Cap D/C 470pf		1	1			
C171	096-1082-29	Cap T .22uf 20V		1	1			
C172	096-1082-47	Cap T 1uf 20V		-	-			
C173	113-3221-00	Cap D/C 220pf		-	-			
C174	113-3221-00	Cap D/C 220pf		-	-			
C175	096-1082-09	Cap T 15uf 20V		1	1			
C176	096-1082-49	Cap T 1uf 50V 20%		1	1			
C177	096-1082-05	Cap T 10uf 20V 10%		-	-			
C178	111-0001-13	Cap MC 0.1uf		-	0			
C178	111-0001-03	Cap MC .22uf		0	1			
C179	113-3221-00	Cap D/C 220pf		-	-			
C180	113-5102-00	Cap D/C 1000pf		-	-			
C181	113-3221-00	Cap D/C 220pf		-	-			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
I101	120-4006-01	IC SP8640B		1	1			
I102	120-0123-00	IC 74LS113		1	1			
I103	120-0079-00	IC 74LS00		1	1			
I104	120-0088-00	IC 74LS163		2	2			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
I105	120-0087-00	IC 74LS162		2	2			
I106	120-0088-00	IC 74LS163		-	-			
I107	120-0087-00	IC 74LS162		-	-			
I108	120-6038-01	IC SCL4046AC+		1	1			
I109	120-6062-00	IC CD40109		2	2			
I110	120-6055-01	IC SCL4060AC+		1	1			
I111	120-2032-00	IC 8048		1	1			
I112	120-2028-00	IC ER1400/1400T		1	1			
I113	120-0125-00	IC 88L12		1	1			
I114	120-6062-00	IC CD40109		-	-			
I115	120-3040-01	IC NE555		1	1			
I116	120-3053-00	IC LM358		1	1			
I117	120-3094-24	IC LM340 LAZ-5		1	1			
I118	120-3048-00	IC LM339		1	1			
I119	120-3088-00	IC LM378		1	1			
R101	130-0271-23	Res F/C 270 QW 5%		1	1			
R102	130-0821-23	Res F/C 820 QW 5%		2	2			
R103	130-0221-23	Res F/C 220 QW 5%		3	3			
R104	130-0182-23	Res F/C 1.8K QW 5%		3	3			
R105	130-0331-23	Res F/C 330 QW 5%		2	2			
R106	130-0331-23	Res F/C 330 QW 5%		-	-			
R107	130-0681-23	Res F/C 680 QW 5%		4	4			
R108	130-0681-23	Res F/C 680 QW 5%		-	-			
R109	130-0473-23	Res F/C 47K QW 5%		3	3			
R110	130-0103-23	Res F/C 10K QW 5%		8	8			
R111	130-0473-23	Res F/C 47K QW 5%		-	-			
R112	130-0681-33	Res F/C 680 HW 5%		1	1			
R113	130-0102-23	Res F/C 1K QW 5%		7	7			
R114	130-0223-23	Res F/C 22K QW 5%		4	4			
R115	130-0475-23	Res F/C 4.7M QW 5%		1	1			
R116	130-0471-23	Res F/C 470 QW 5%		2	2			
R117	130-0753-23	Res F/C 75K QW 5%		2	2			
R118	130-0133-23	Res F/C 13K QW 5%		1	1			
R119	130-0204-23	Res F/C 200K QW 5%		2	2			
R120	130-0683-23	Res F/C 68K QW 5%		2	2			
R121	130-0153-23	Res F/C 15K QW 5%		1	1			
R122	130-0823-23	Res F/C 82K QW 5%		1	1			
R123	130-0204-23	Res F/C 200K QW 5%		-	-			
R124	130-0683-23	Res F/C 68K QW 5%		-	-			
R125	130-0392-23	Res F/C 3.9K QW 5%		1	1			
R126	130-0394-23	Res F/C 390K QW 5%		2	2			
R127	130-0394-23	Res F/C 390K QW 5%		-	-			
R128	130-0104-23	Res F/C 100K QW 5%		6	6			
R129	130-0104-23	Res F/C 100K QW 5%		-	-			
R130	133-0132-01	Res Vari 1K		2	2			
R131	130-0202-23	Res F/C 2K QW 5%		2	2			
R132	130-0472-23	Res F/C 4.7K QW 5%		3	3			
R133	130-0511-23	Res F/C 510 QW 5%		2	2			
R134	130-0622-23	Res F/C 6.2K QW 5%		1	1			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R135	130-0821-23	Res F/C 820 QW 5%		-	-			
R136	130-0621-23	Res F/C 620 QW 5%		1	1			
R137	130-0333-23	Res F/C 33K QW 5%		1	1			
R138	130-0122-23	Res F/C 1.2K QW 5%		1	1			
R139	130-0152-23	Res F/C 1.5K QW 5%		2	2			
R140	130-0301-23	Res F/C 300 QW 5%		1	1			
R141	130-0220-23	Res F/C 22 QW 5%		1	1			
R142	130-0152-23	Res F/C 1.5K QW 5%		-	-			
R143	130-0472-23	Res F/C 4.7K QW 5%		-	-			
R144	130-0820-23	Res F/C 82 QW 5%		1	1			
R145	130-0182-23	Res F/C 1.8K QW 5%		-	-			
R146	130-0221-23	Res F/C 220 QW 5%		-	-			
R147	130-0103-23	Res F/C 10K QW 5%		-	-			
R148	130-0104-23	Res F/C 100K QW 5%		-	-			
R149	130-0103-23	Res F/C 10K QW 5%		-	-			
R150	130-0511-23	Res F/C 510 QW 5%		-	-			
R151	130-0103-23	Res F/C 10K QW 5%		-	-			
R152	130-0302-23	Res F/C 3K QW 5%		2	2			
R153	130-0103-23	Res F/C 10K QW 5%		-	-			
R154	130-0681-23	Res F/C 680 QW 5%		-	-			
R155	130-0302-23	Res F/C 3K QW 5%		-	-			
R156	130-0162-23	Res F/C 1.6K QW 5%		1	1			
R157	130-0102-23	Res F/C 1K QW 5%		-	-			
R158	130-0753-23	Res F/C 75K QW 5%		-	-			
R159	133-0132-01	Res Vari 1K		-	-			
R160	130-0101-23	Res F/C 100 QW 5%		2	2			
R161	130-0391-23	Res F/C 390 QW 5%		1	1			
R162	130-0181-23	Res F/C 180 QW 5%		2	2			
R163	130-0221-23	Res F/C 220 QW 5%		-	-			
R164	130-0103-23	Res F/C 10K QW 5%		-	-			
R165	130-0361-23	Res F/C 360 QW 5%		1	1			
R166	130-0912-23	Res F/C 9.1K QW 5%		1	1			
R167	133-0132-03	Res Vari 10K		1	1			
R168	136-1021-72	Res MF 1.02K QW 1%		1	1			
R169	130-0754-23	Res F/C 750K QW 5%		1	1			
R170	130-0471-23	Res F/C 470 QW 5%		-	-			
R171	130-0243-23	Res F/C 24K QW 5%		1	1			
R172	136-1003-72	Res MF 100K QW 1%		2	2			
R173	136-1003-72	Res MF 100K QW 1%		-	-			
R174	130-0120-23	Res F/C 12 QW 5%		1	1			
R175	136-1001-72	Res MF 1.00K QW 1%		1	1			
R176	136-9091-72	Res MF 9.09K QW 1%		1	1			
R177	136-1502-72	Res MF 15.0K QW 1%		1	1			
R178	136-4753-72	Res MF 475K QW 1%		1	1			
R179	130-0102-23	Res F/C 1K QW 5%		-	-			
R180	136-1501-72	Res MF 1.50K QW 1%		1	0			
R180	136-1211-72	Res MF 1.21K QW 1%		0	1			
R181	136-0161-72	Res MF 8.16K QW 1%		1	0			
R181	136-5761-72	Res MF 5.76K QW 1%		0	1			

NAME	Main Board	ASS'Y. NO.	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R182	130-0132-43	Res F/C 1.3K 1W 5%		1	1			
R183	130-0132-43	Res F/C 1.3K 1W 5%		1	1			
R184	136-7501-72	Res MF 7.50K QW 1%		1	1			
R185	132-5051-00	Res WW .15 2W		2	2			
R186	132-5051-00	Res WW .15 2W		-	-			
R187	130-0102-23	Res F/C 1K QW 5%		-	-			

NAME	ASS'Y. NO.
Main Board	200-6045-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R188	130-0912-23	Res F/C 9.1K QW 5%		1	1			
R189	136-2492-72	Res MF 24.9K QW 1%		3	3			
R190	130-0223-23	Res F/C 22K QW 5%		-	-			
R191	136-2492-72	Res MF 24.9K QW 1%		-	-			
R192	130-0363-23	Res F/C 36K QW 5%		1	1			
R193	130-0681-23	Res F/C 680 QW 5%		-	-			
R194	130-0472-23	Res F/C 4.7K QW 5%		-	-			
R195	130-0393-23	Res F/C 39K QW 5%		2	2			
R196	130-0433-23	Res F/C 43K QW 5%		1	1			
R197	130-0393-23	Res F/C 39K QW 5%		-	-			
R198	130-0104-23	Res F/C 100K QW 5%		-	-			
R199	130-0104-23	Res F/C 100K QW 5%		-	-			
R200	130-0822-23	Res F/C 8.2K QW 5%		1	1			
R201	136-2492-72	Res MF 24.9K QW 1%		-	-			
R202	136-5621-72	Res MF 5.62K QW 1%		1	1			
R203	130-0104-23	Res F/C 100K QW 5%		-	-			
R204	130-0180-23	Res F/C 18 QW 5%		1	1			
R205	132-5046-00	Res WW .05 2W		1	1			
R206	130-0270-23	Res F/C 27 QW 5%		1	1			
R207	130-0224-23	Res F/C 220K QW 5%		1	1			
R208	130-0102-23	Res F/C 1K QW 5%		-	-			
R209	130-0223-23	Res F/C 22K QW 5%		-	-			
R210	130-0202-23	Res F/C 2K QW 5%		-	-			
R211	130-0203-23	Res F/C 20K QW 5%		1	1			
R212	130-0201-23	Res F/C 200 QW 5%		2	2			
R213	130-0201-23	Res F/C 200 QW 5%		-	-			
R214	130-0473-23	Res F/C 47K QW 5%		-	-			
R215	136-1331-72	Res MF 1.33K QW 1%		1	1			
R216	130-0223-23	Res F/C 22K QW 5%		-	-			
R217	130-0182-23	Res F/C 1.8K QW 5%		-	-			
R218	130-0103-23	Res F/C 10K QW 5%		-	-			
R219	130-0102-23	Res F/C 1K QW 5%		-	-			
R220	130-0101-23	Res F/C 100 QW 5%		-	-			
R221	130-0181-23	Res F/C 180 QW 5%		-	-			
R222	130-0102-23	Res F/C 1K QW 5%		-	-			
R223	130-0101-13	Res F/C 100 EW 5%		2	2			
R224	136-3093-72	Res MF 309K QW 1%		1	0			
R224	136-6943-72	Res MF 694K QW 1%		0	1			
R225	130-0150-23	Res F/C 15 QW 5%		1	1			
R226	130-0103-23	Res F/C 10K QW 5%		-	-			
R227	130-0101-23	Res F/C 100 EW 5%		-	-			

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Main Board				ASS'Y. NO. 200-6045-00/01
ASS'Y. DWG. 300-6045-00		UNIT KY196/196E/ KY 197 197E		USED ON 064=1019-00/01 064-1021-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
3				
4				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Main Board				ASS'Y. NO. 200-6045-00/01
ASS'Y. DWG. 300-6045-00			UNIT KY196/196E/ KY 197 197E	USED ON 064=1019-00/01 064-1021-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
3				
4				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978

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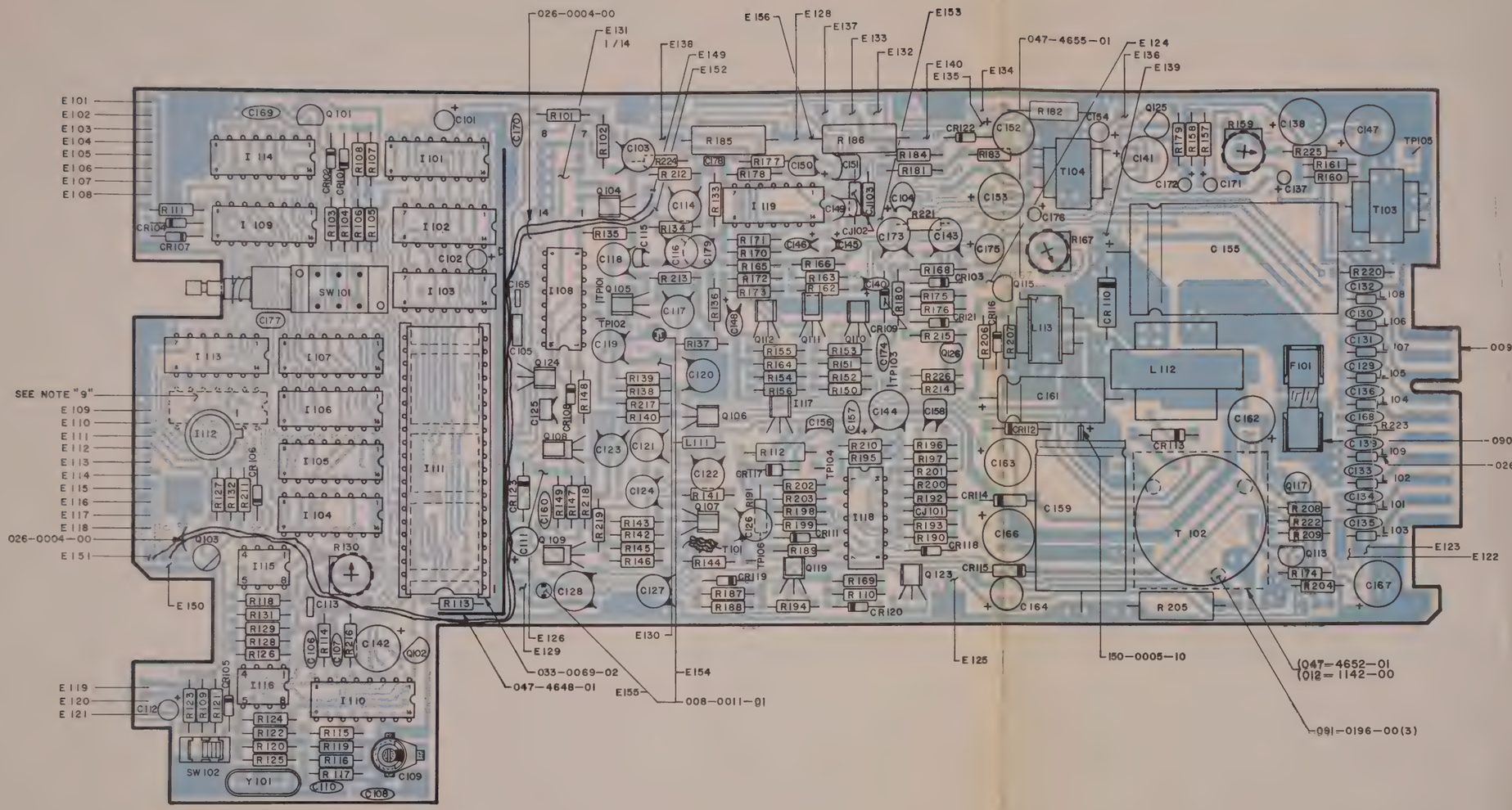


NOTES:

1. PRIOR TO POST COATING BOTH SIDES OF ASS'Y WITH CLEAR URETHANE COATING (016-1040-00), MASK OFF THE FOLLOWING: ALL MOUNTING AREAS, TP101 THRU TP106, C109, R130, R159, R167, F101 & FUSE CLIPS CONNECTOR FINGERS, I.C. SOCKET FOR I111, ALL "E" NUMBERS, SW101 & SW102.
2. TRAN. Q126, SEE DETAIL "A".
3. TRANS. Q101, Q113, Q117, Q115, SEE DETAIL "B".
4. TRANS. Q102, Q103, Q125, SEE DETAIL "C."
5. TRANS. Q104, THRU Q107, SEE DETAIL "D."
6. TRANS. Q110, Q112, Q123, Q124, SEE DETAIL "E."
7. TRANS. Q108, Q109, Q111, Q119, SEE DETAIL "F."
8. I.C. I117, SEE DETAIL "G."
9. I112 (120-2028-00) MAY BE EITHER AN 8 PIN I.C. (120-2028-02) OR A 14 PIN I.C. (120-2028-01).

WIRING CHART			
FROM	TO	KING PART NO	DESCRIPTION
E149	E150	025-0018-55	26 AWG GREEN
E152	E151	025-0018-50	26 AWG GRN/BLK.

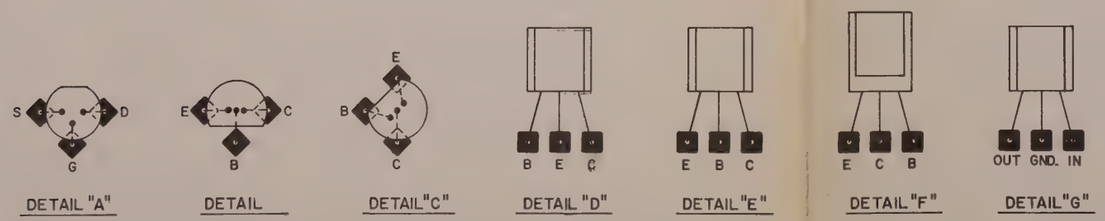


FIGURE 6-5 KY 196/196E MAIN BOARD ASSEMBLY
(Dwg. No. 300-6045-00, R-0)

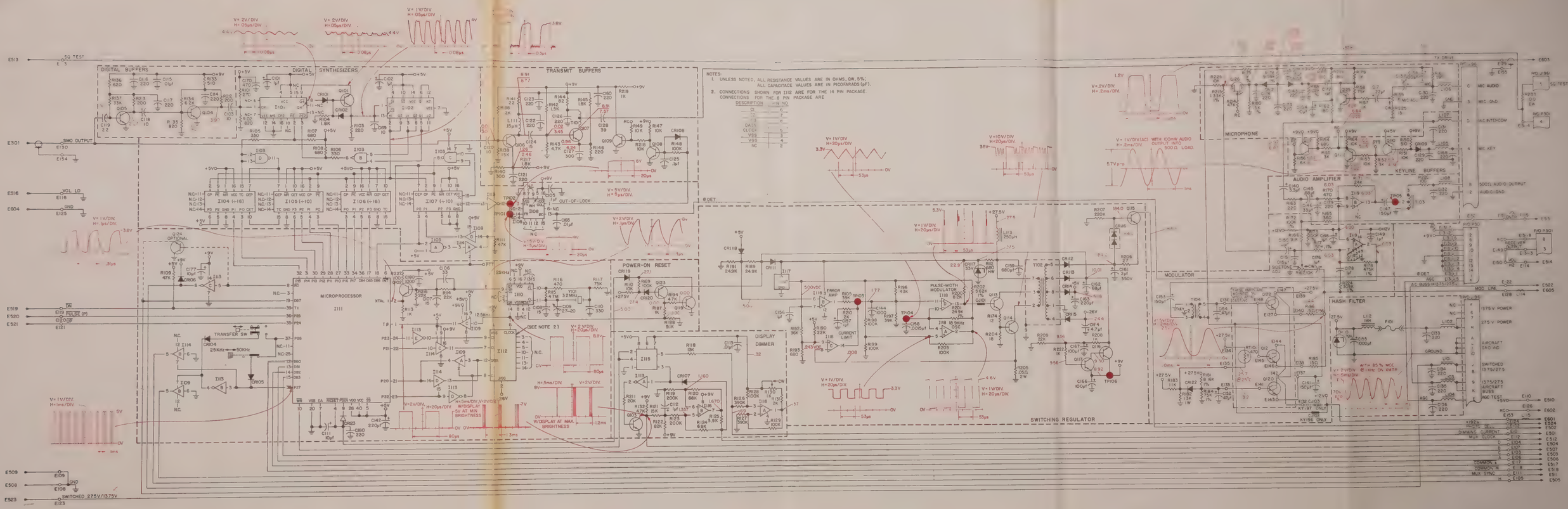
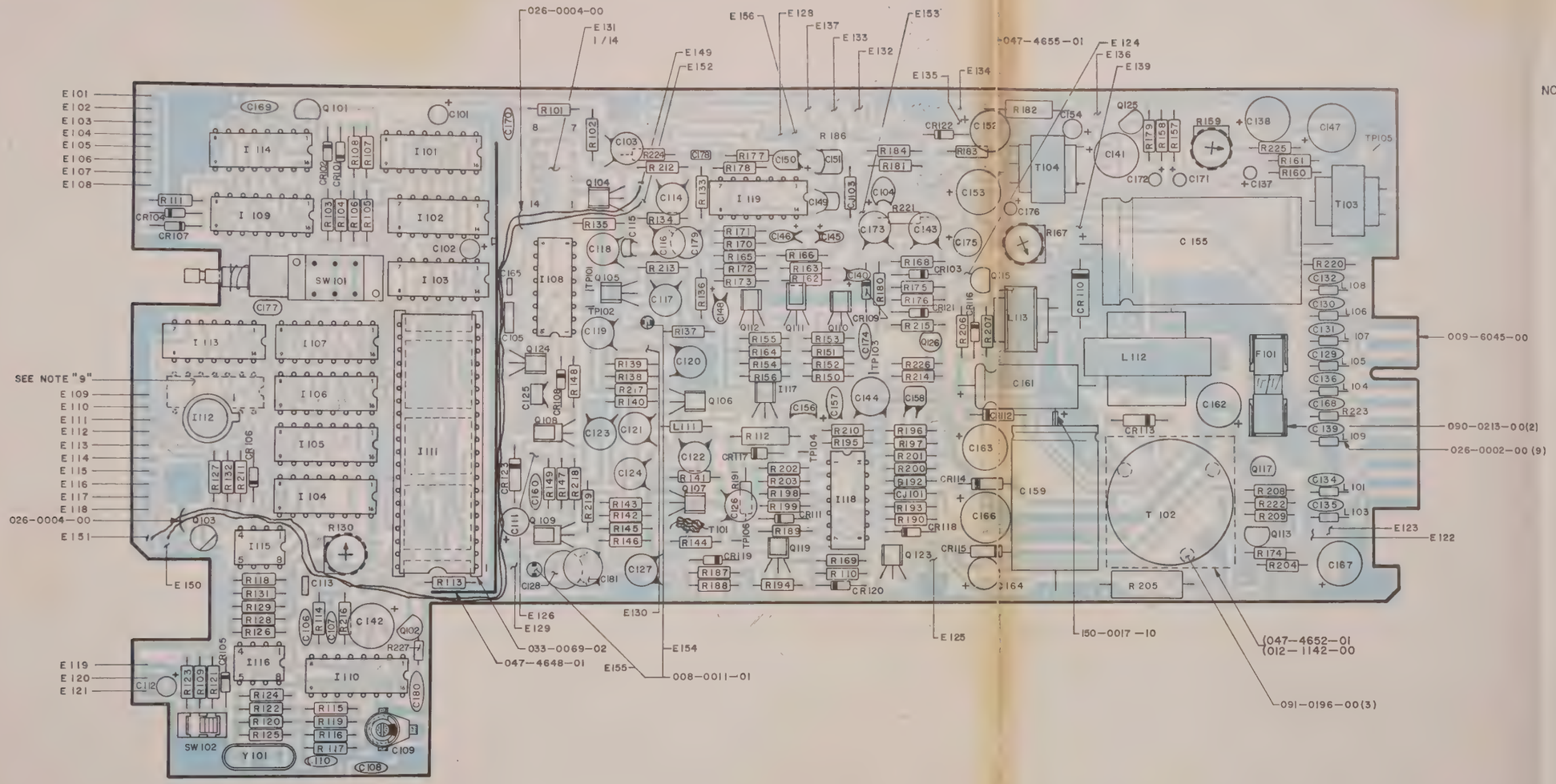


FIGURE 6-6 KY 196/196E MAIN BOARD SCHEMATIC
(Dwg. No. 002-6045-00, R-0)



NOTES:

1. PRIOR TO POST COATING BOTH SIDES OF ASS'Y WITH CLEAR URETHANE COATING (016-1040-00), MASK OFF THE FOLLOWING: ALL MOUNTING AREAS, TP105 THRU TP106, C109, R130, R159, R167, F101 & FUSE CLIPS CONNECTOR FINGERS, I.C. SOCKET FOR I111, ALL "E" NUMBERS, SW101 & SW102.
2. TRAN. Q126, SEE DETAIL "A".
3. TRANS. Q101, Q113, Q117, Q115, SEE DETAIL "B".
4. TRANS. Q102, Q103, Q125, SEE DETAIL "C".
5. TRANS. Q104, THRU Q107, SEE DETAIL "D".
6. TRANS. Q110, Q112, Q123, Q124, SEE DETAIL "E".
7. TRANS. Q108, Q109, Q111, Q119, SEE DETAIL "F".
8. I.C. I117, SEE DETAIL "G".
9. I112 (120-2028-00) MAY BE EITHER AN 8 PIN I.C. (120-2028-02) OR A 14 PIN I.C. (120-2028-01).

WIRING CHART

FROM	TO	KING PART NO	DESCRIPTION
E149	E150	025-0018-55	26 AWG GREEN
E152	E151	025-0018-50	26 AWG GRN/BLK.

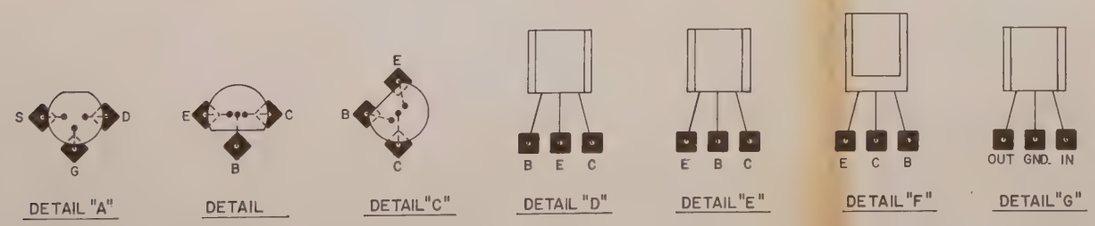


FIGURE 6-7 KY 197/197E MAIN BOARD ASSEMBLY
(Dwg. No. 300-6045-01, R-0)

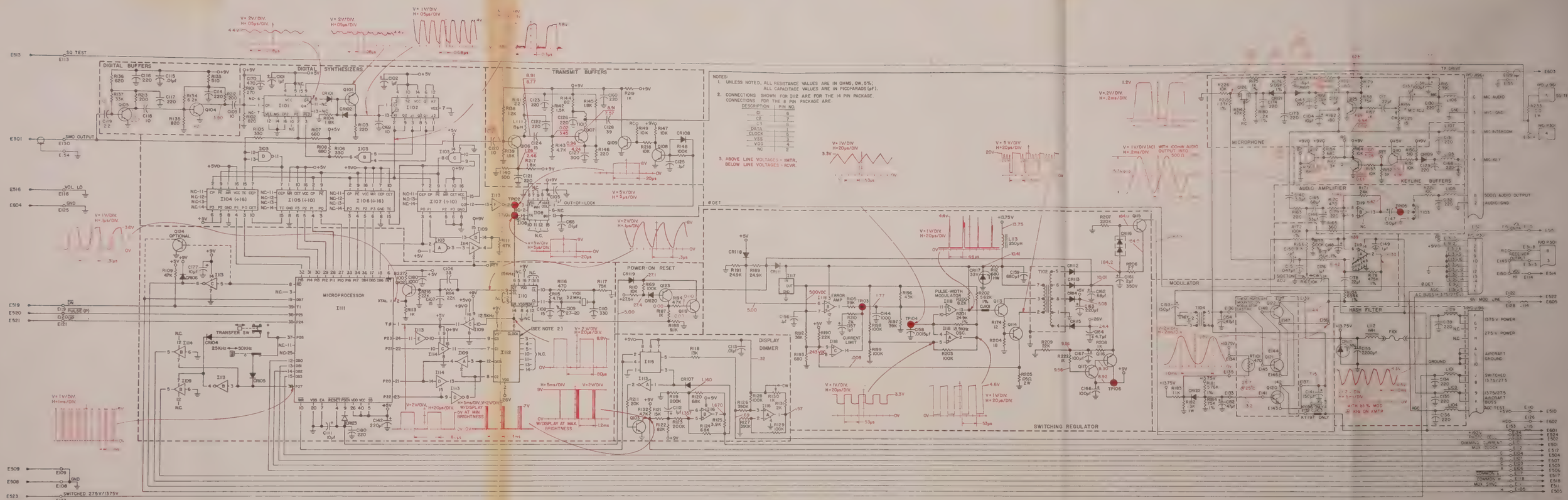


FIGURE 6-8 KY 197/197E MAIN BOARD SCHEMATIC
(Dwg. No. 002-6045-01, R-0)

NAME	Receiver Board	ASS'Y. NO.	200-6046-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	200-6046-00	Receiver Board 196 & 197		X				
	200-6046-01	Receiver Board 196E & 197E			X			
	009-6046-00	Receiver PC Board		1	1			
	012-1139-00	Insulator , VCO		1	1			
	012-1140-00	Insulator ,Preselector		1	1			
	012-1141-00	Insulator , Mixer		1	1			
	016-1040-00	Post Coating		AR	AR			
	026-0001-00	Wire Tinned Copper #26		-	AR			
	047-2154-00	Toko Can 10MM		1	1			
	047-4653-01	Receiver Fence		1	1			
	047-4654-01	Receiver Cover		1	1			
	047-4649-01	Shield, Mixer		1	1			
	047-4650-01	Shield, Preselector		1	1			
	047-4651-01	Shield, VCO		1	1			
	057-2172-00	Decal, Receiver Cover		1	1			
	088-0066-00	Spacers Xtal		4	3			
	089-5499-04	Screw FH 4-24 x ¼		4	4			
	091-0015-00	Grommet		1	1			
	091-0055-01	Screw Nylon		3	3			
	150-0002-10	Teflon Tubing #26 Nat		-	AR			
Q301	007-0254-00	Tstr MPS A92		1	1			
Q302	007-0317-01	Tstr SD306		1	1			
Q303	007-0317-00	Tstr SD305		1	1			
Q304	007-0220-00	Tstr MPS6568A		1	1			
Q305	NOT USED							
Q306	NOT USED							
Q307	007-0195-00	Tstr MPS H10		2	2			
Q308	007-0195-00	Tstr MPS H10		-	-			

NAME	Receiver Board	ASS'Y. NO.	200-6046-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
CR301	007-4025-00	VCTR MV109		5	5			
CR302	007-4025-00	VCTR MV109		-	-			
CR303	007-4025-00	VCTR MV109		-	-			
CR304	007-4025-00	VCTR MV109		-	-			
CR305	007-6016-00	Diode 1N4154		6	6			
CR306	007-6016-00	Diode 1N4154		-	-			
CR307	007-6016-00	Diode 1N4154		-	-			
CR308	NOT USED							
CR309	007-6016-00	Diode 1N4154		-	-			
CR310	007-6016-00	Diode 1N4154		-	-			
CR311	NOT USED							
CR312	007-4025-00	VCTR MV109		-	-			
CR313	007-6016-00	Diode 1N4154		-	-			
TP301	008-0096-01	Test Point		6	6			
TP302	008-0096-01	Test Point		-	-			
TP303	008-0096-01	Test Point		-	-			
TP304	008-0096-01	Test Point		-	-			
TP305	008-0096-01	Test Point		-	-			
TP306	008-0096-01	Test Point		-	-			
FL301	017-0069-00	FIL IF (DO-156)		1	0			
FL302	017-0069-00	FIL IF (DO-156)		REF	0			
FL303	017-0069-00	FIL IF (DO-156)		REF	0			
FL304	017-0069-00	FIL IF (DO-156)		REF	0			
FL305	017-0068-00	FIL IF (DO-109)		0	1			
FL306	017-0068-00	FIL IF (DO-109)		0	REF			
FL307	017-0068-00	FIL IF (DO-109)		0	REF			
L301	NOT USED							
L302	019-3081-00	Coil RF (T-Form)		3	3			
L303	019-2084-24	Choke 1.5uh		1	1			
L304	019-3087-00	Coil RF (T-Form)		1	1			
L305	019-2084-29	Choke 2.2uh		2	2			
L306	019-3081-00	Coil RF (T-Form)		-	-			
L307	019-2084-29	Choke 2.2uh		-	-			
L308	019-3081-00	Coil RF (T-Form)		-	-			
L309	019-8078-00	Coil Tuneable 20MH		2	2			
L310	019-8078-00	Coil Tuneable 20MH		-	-			
L311	019-8071-00	Coil Tuneable 55MH		1	1			
L312	019-2084-49	Coil 15uh		1	1			
L313	019-3080-00	Coil VCO		1	1			
T301	019-8079-00	Xfmr IF		1	1			
T302	019-8080-00	Xfmr IF		1	1			
T303	019-8070-00	Xfmr IF		1	1			
T304	019-8081-00	Xfmr IF		1	1			
T305	019-3082-00	Xfmr RF		1	1			
J301	033-0053-01	Socket 14 Pin		1	1			

NAME	ASS'Y. NO.
Receiver Board	200-6046-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C301	113-3039-00	Cap D/C 3.9pf		1	1			
C302	113-3221-00	Cap D/C 220pf		22	22			
C303	096-1082-45	Cap T 2.2uf 35V		1	1			
C304	NOT USED							
C305	113-3221-00	Cap D/C 220pf		-	-			
C306	113-3027-00	Cap D/C 2.7pf		1	1			
C307	113-3221-00	Cap D/C 220pf		-	-			
C308	113-3221-00	Cap D/C 220pf		-	-			
C309	111-0001-12	Cap M/C .047uf		11	11			
C310	113-3221-00	Cap D/C 220pf		-	-			
C311	113-3100-00	Cap D/C 10pf		4	4			
C312	113-3221-00	Cap D/C 220pf		-	-			
C313	NOT USED							
C314	113-3221-00	Cap D/C 220pf		-	-			
C315	113-3221-00	Cap D/C 220pf		-	-			
C316	NOT USED							
C317	113-3221-00	Cap D/C 220pf		-	-			
C318	113-3100-00	Cap D/C 10pf		-	-			
C319	111-0001-12	Cap M/C .047uf		-	-			
C320	111-0001-10	Cap M/C .0039uf		2	2			
C321	096-1082-13	Cap T .33uf 20V		1	1			
C322	113-5102-00	Cap D/C 1000pf		3	3			
C323	113-7503-00	Cap D/C .05uf 12V		5	5			
C324	113-3221-00	Cap D/C 220pf		-	-			
C325	111-0001-12	Cap M/C .047uf		-	-			
C326	111-0001-12	Cap M/C .047uf		-	-			
C327	113-7503-00	Cap D/C .05uf 12V		-	-			
C328	113-7503-00	Cap D/C .05uf 12V		-	-			
C329	113-3221-00	Cap D/C 220pf		-	-			
C330	111-0001-12	Cap M/C .047uf		-	-			
C331	113-7503-00	Cap D/C .05uf 12V		-	-			
C332	096-1082-31	Cap T 4.7uf 35V		2	2			
C333	113-5102-00	Cap D/C .001uf		-	-			
C334	113-5102-00	Cap D/C .001uf		-	-			
C335	096-1082-12	Cap T 3.3uf 15V		1	1			
C336	096-1082-47	Cap T 1uf 20V		4	4			
C337	118-0029-00	Cap D/C .22uf 12V		2	2			
C338	113-7503-00	Cap D/C .05uf 12V		-	-			
C339	118-0029-00	Cap D/C .22uf 12V		-	-			
C340	111-0001-12	Cap M/C .047uf		-	-			
C341	096-1030-08	Cap T 100uf 15V 20%		1	1			
C342	096-1024-00	Cap T 47uf 20V 20%		1	1			
C343	NOT USED							
C344	NOT USED							
C345	NOT USED							
C346	113-3221-00	Cap D/C 220pf		-	-			
C347	111-0001-12	Cap M/C .047uf		-	-			
C348	096-1082-31	Cap T 4.7uf 35V		-	-			
C349	111-0001-12	Cap M/C .047uf		-	-			
C350	113-5821-00	Cap D/C 820pf		1	1			
C351	096-1082-40	Cap T 3.3uf 35V		1	1			
C352	111-0001-12	Cap M/C .047uf		-	-			
C353	113-3221-00	Cap D/C 220pf		-	-			

NAME	Receiver Board	ASS'Y. NO.	200-6046-00/01

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C354	111-0001-07	Cap M/C .022uf		1	1			
C355	113-3082-00	Cap D/C 8.2pf		2	2			
C356	113-3100-00	Cap D/C 10pf		-	-			
C357	113-3100-00	Cap D/C 10pf		-	-			
C358	113-3560-00	Cap D/C 56pf		1	1			
C359	111-0001-12	Cap M/C .047uf		-	-			
C360	113-3221-00	Cap D/C 220pf		-	-			
C361	113-3121-00	Cap D/C 120pf		1	1			
C362	113-3220-00	Cap D/C 22pf		1	1			
C363	106-0001-31	Cap MUD 1.1pf 5%		2	0			
C364	106-0001-03	Cap MUD 1.5pf 5%		1	0			
C365	106-0001-31	Cap MUD 1.1pf 5%		-	0			
C366	NOT USED							
C367	096-1082-47	Cap T 1.0uf 20V		-	-			
C368	096-1082-47	Cap T 1.0uf 20V		-	-			
C369	113-7203-00	Cap D/C .02uf 12V		1	1			
C370	NOT USED							
C371	096-1030-28	Cap T 47uf 20V		1	1			
C372	113-3082-00	Cap D/C 8.2pf		-	-			
C373	111-0001-12	Cap M/C .047uf		-	-			
C374	111-0001-10	Cap M/C .0039uf		-	-			
C375	096-1082-09	Cap T 15uf 20V		1	1			
C376	111-0001-13	Cap M/C .1uf		1	1			
C377	NOT USED							
C378	NOT USED							
C379	NOT USED							
C380	096-1082-04	Cap T 6.8uf 20V 20%		1	1			
C381	113-3221-00	Cap D/C 220pf		-	-			
C382	113-3221-00	Cap D/C 220pf		-	-			
C383	113-3221-00	Cap D/C 220pf		-	-			
C384	113-3221-00	Cap D/C 220pf		-	-			
C385	113-3221-00	Cap D/C 220pf		-	-			
C386	113-3221-00	Cap D/C 220pf		-	-			
C387	113-3221-00	Cap D/C 220pf		-	-			
C388	113-3221-00	Cap D/C 220pf		-	-			
C389	096-1082-47	Cap T 1.0uf 20V		-	-			
I301	120-3029-00	IC CA3086		2	2			
I302	120-3029-00	IC CA3086		-	-			
I303	120-3020-00	IC MC1350		1	1			
I304	120-3053-00	IC LM358		1	1			
R301	130-0123-23	Res F/C 12K 5% QW		2	2			
R302	130-0122-23	Res F/C 1.2K 5% QW		1	1			
R303	130-0513-23	Res F/C 51K 5% QW		7	7			
R304	130-0513-23	Res F/C 51K 5% QW		-	-			
R305	130-0433-23	Res F/C 43K 5% QW		1	1			
R306	130-0513-23	Res F/C 51K 5% QW		-	-			
R307	130-0470-23	Res F/C 47 5% QW		3	3			
R308	130-0563-23	Res F/C 56K 5% QW		3	3			

NAME	ASS'Y. NO.
Receiver Board	200-6046-00/01

KING RADIO CORP. PARTS LISTING

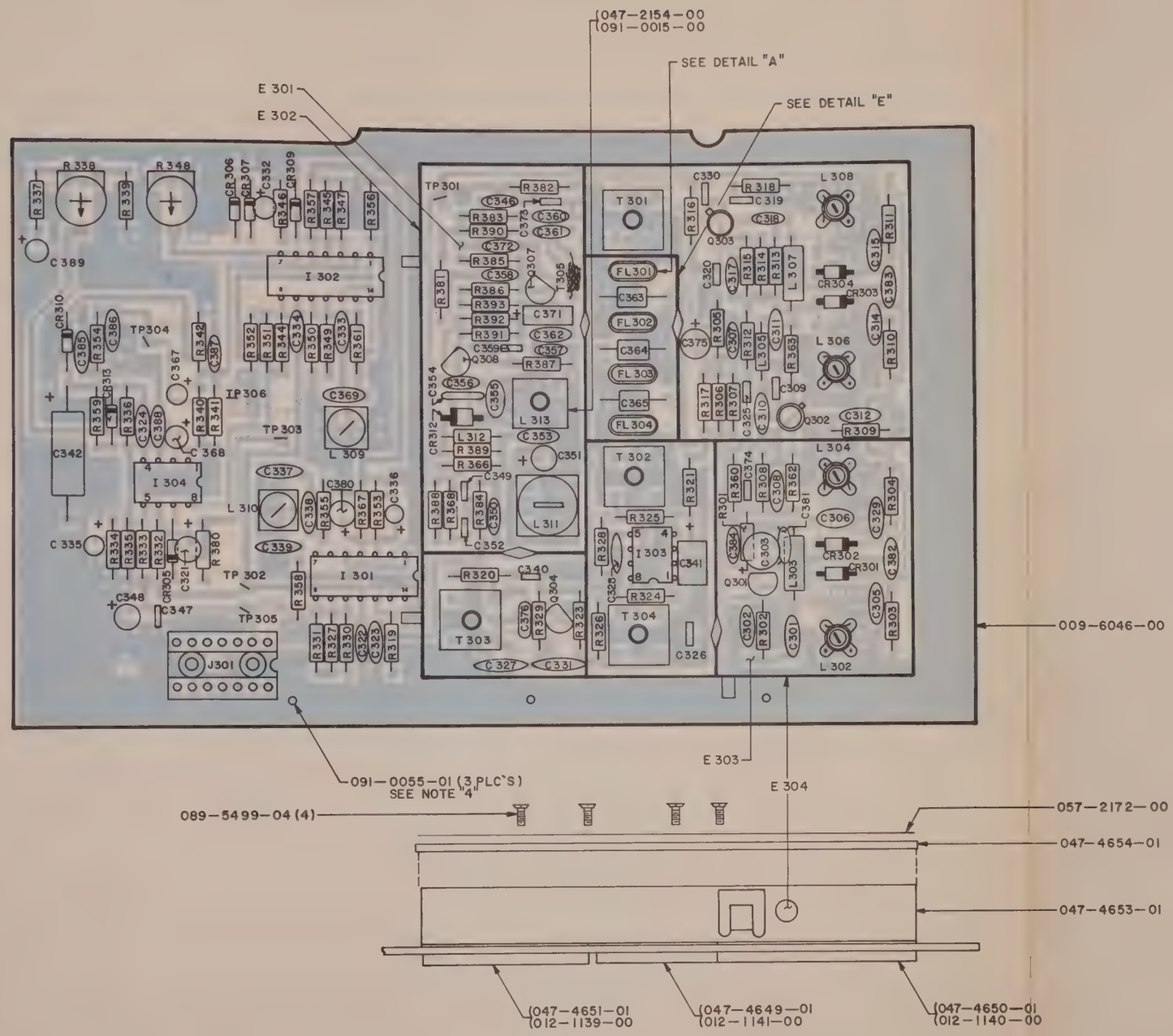
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R309	130-0151-23	Res F/C 150 5% QW		1	1			
R310	130-0513-23	Res F/C 51K 5% QW		-	-			
R311	130-0513-23	Res F/C 51K 5% QW		-	-			
R312	130-0393-23	Res F/C 39K 5% QW		1	1			
R313	130-0563-23	Res F/C 56K 5% QW		-	-			
R314	130-0513-23	Res F/C 51K 5% QW		-	-			
R315	130-0563-23	Res F/C 56K 5% QW		-	-			
R316	130-0104-23	Res F/C 100K 5% QW		4	0			
R317	130-0220-23	Res F/C 22 5% QW		4	4			
R318	130-0331-23	Res F/C 330 5% QW		2	2			
R319	130-0473-23	Res F/C 47K 5% QW		2	2			
R320	130-0100-23	Res F/C 10 5% QW		1	1			
R321	130-0220-23	Res F/C 22 5% QW		-	-			
R322	NOT USED							
R323	130-0153-23	Res F/C 15K 5% QW		1	1			
R324	130-0103-23	Ref F/C 10K 5% QW		6	6			
R325	130-0104-23	Res F/C 100K 5% QW		-	0			
R326	130-0682-23	Res F/C 6.8K 5% QW		1	1			
R327	130-0911-23	Res F/C 910 QW 5%		2	2			
R328	130-0123-23	Res F/C 12K 5% QW		-	-			
R329	130-0471-23	Res F/C 470 5% QW		1	1			
R330	130-0560-23	Res F/C 56 5% QW		1	1			
R331	130-0112-23	Res F/C 1.1K 5% QW		1	1			
R332	130-0683-23	Res F/C 68K 5% QW		1	1			
R333	136-2152-72	Res MF 21.5K 1% QW		1	1			
R334	136-3242-72	Res MF 32.4K 1% QW		1	1			
R335	130-0392-23	Res F/C 3.9K 5% QW		2	2			
R336	130-0103-23	Res F/C 10K 5% QW		-	-			
R337	130-0133-23	Res F/C 13K QW 5%		1	1			
R338	133-0132-02	Res Vari 5K		1	1			
R339	130-0822-23	Res F/C 8.2K QW 5%		1	1			
R340	130-0104-23	Res F/C 100K 5% QW		-	2			
R341	130-0362-23	Res F/C 3.6K QW 5%		1	1			
R342	130-0432-23	Res F/C 4.3K QW 5%		1	1			
R343	NOT USED							
R344	130-0472-23	Res F/C 4.7K 5% QW		4	4			
R345	130-0273-23	Res F/C 27K QW 5%		1	1			
R346	130-0203-23	Res F/C 20K QW 5%		1	1			
R347	130-0431-23	Res F/C 430 QW 5%		1	1			
R348	133-0132-00	Res Vari 500 Ohm		1	1			
R349	130-0472-23	Res F/C 4.7K QW 5%		-	-			
R350	130-0911-23	Res F/C 910 QW 5%		-	-			
R351	130-0513-23	Res F/C 51K QW 5%		-	-			
R352	130-0113-23	Res F/C 11K QW 5%		1	1			
R353	130-0102-23	Res F/C 1K QW 5%		2	2			
R354	130-0103-23	Res F/C 10K QW 5%		-	-			
R355	130-0201-23	Res F/C 200 QW 5%		1	1			
R356	130-0102-23	Res F/C 1K QW 5%		-	-			
R357	130-0681-23	Res F/C 680 QW 5%		1	1			
R358	130-0152-23	Res F/C 1.5K 5% QW		2	2			
R359	130-0202-23	Res F/C 2K 5% QW		1	1			

NAME	Receiver Board	ASS'Y. NO.	200-6046-00/01

KING RADIO CORP. PARTS LISTING

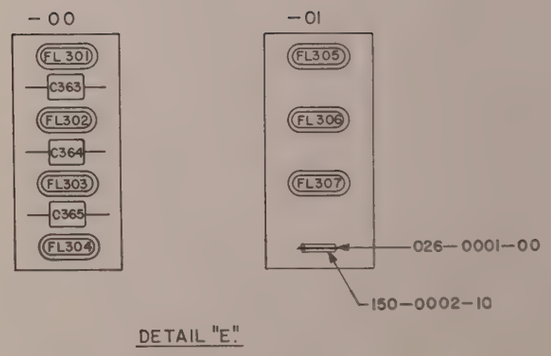
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	02	-03	-04
R360	130-0103-23	Res F/C 10K QW 5%		-	-			
R361	130-0472-23	Res F/C 4.7K 5% QW		-	-			
R362	130-0220-23	Res F/C 22 QW 5%		-	-			
R363	130-0470-23	Res F/C 47 QW 5%		-	-			
R364	NOT USED							
R365	NOT USED							
R366	130-0104-23	Res F/C 100K QW 5%		-	-			
R367	130-0162-23	Res F/C 1.6K QW 5%		1	1			
R368	130-0152-23	Res F/C 1.5K QW 5%		-	-			
R369	NOT USED							
R370	NOT USED							
R371	NOT USED							
R372	NOT USED							
R373	NOT USED							
R374	NOT USED							
R375	NOT USED							
R376	NOT USED							
R377	NOT USED							
R378	NOT USED							
R379	NOT USED							
R380	130-0103-23	Res F/C 10K QW 5%		-	-			
R381	130-0220-23	Res F/C 22 QW 5%		-	-			
R382	130-0510-23	Res F/C 51 QW 5%		1	1			
R383	130-0820-23	Res F/C 82 QW 5%		1	1			
R384	130-0182-23	Res F/C 1.8K QW 5%		1	1			
R385	130-0472-23	Res F/C 4.7K QW 5%		-	-			
R386	130-0821-23	Res F/C 820 QW 5%		1	1			
R387	130-0181-23	Res F/C 180 QW 5%		1	1			
R388	130-0331-23	Res F/C 330 QW 5%		-	-			
R389	130-0473-23	Res F/C 47K QW 5%		-	-			
R390	130-0101-23	Res F/C 100 QW 5%		1	1			
R391	130-0103-23	Res F/C 10K QW 5%		-	-			
R392	130-0470-23	Res F/C 47 QW 5%		-	-			
R393	130-0392-23	Res F/C 3.9K QW 5%		-	-			

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Receiver Board				ASS'Y. NO. 200-6046-00/01
ASS'Y. DWG.		UNIT		USED ON
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
2				
3				
4				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978

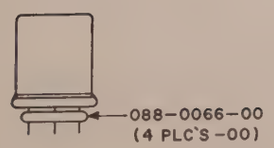


NOTES:

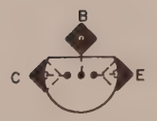
1. TRANSISTOR Q 301, SEE DETAIL "B."
2. TRANSISTORS Q 304, Q 307 & Q 308, SEE DETAIL "C".
3. TRANSISTORS Q 302 & Q 303, SEE DETAIL "D".
4. INSERT NYLON SCREW THROUGH FARSIDE OF P.C. BOARD, AND HEAT-STAKE TO HOLD IT IN THE BOARD.



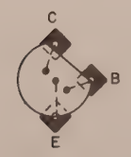
DETAIL "E."



DETAIL "A."



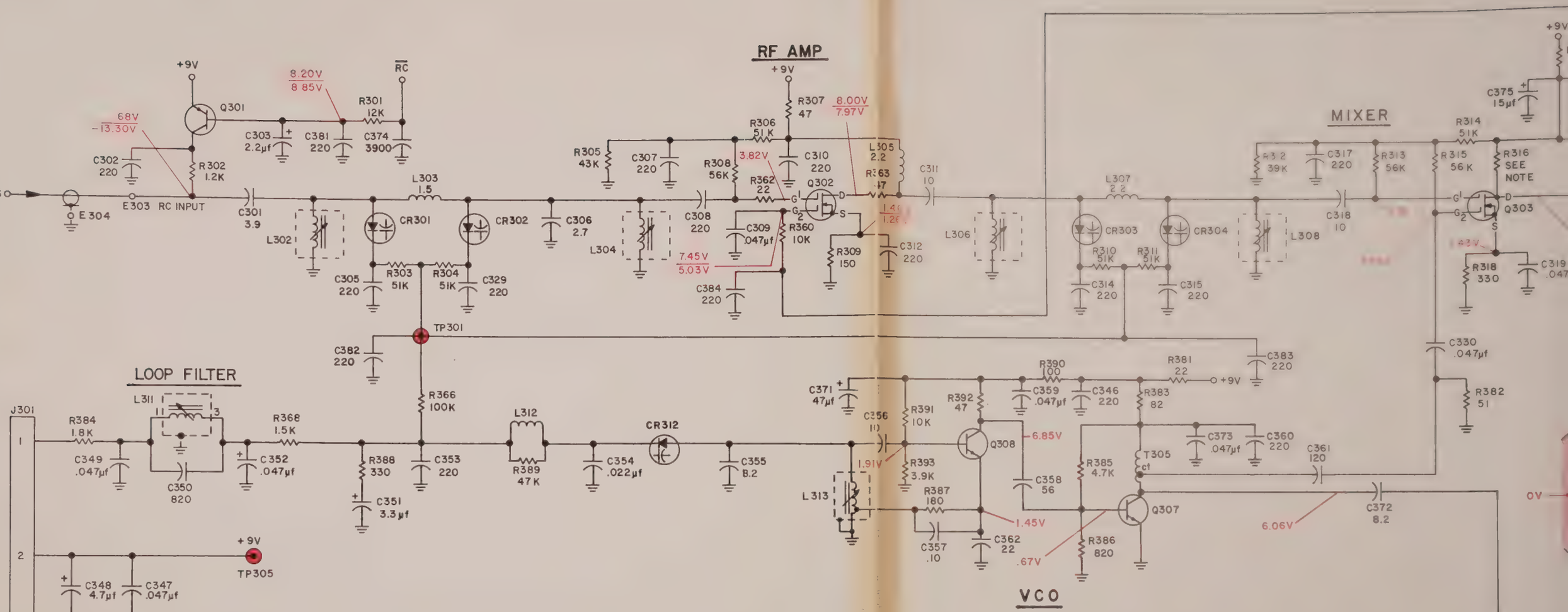
DETAIL "B."



DETAIL "C."

DETAIL "D."

FIGURE 6-9 RECEIVER BOARD ASSEMBLY
(Dwg. No. 300-6046-00, R-0)



NOTES:

1. UNLESS NOTED; ALL RESISTANCE VALUES ARE IN OHMS, QW, 5%.
   ALL CAPACITANCE VALUES ARE IN MICROFARADS (µf),
   ALL INDUCTANCES VALUES ARE IN MICROHENRIES (µH).

2. VOLTAGES ABOVE - NO SIGNAL
   VOLTAGES BELOW - 100µV HARD/30% 1KHz MOD.

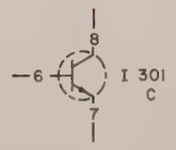


FIGURE 6-10 RECEIVER BOARD SCHEMATIC
(Dwg. No. 002-6046-00, R-0)

NOTE:
R316, R325
KY196/197 - 100 K
KY196E/197E - NOT USED

C320 3900

T301

CRYSTAL FILTER

(KY196/197 ONLY)

FL301 FL302 FL303 FL304

C363 1.1 C364 1.5 C365 1.1

FL305 FL306 FL307

(KY196E/197E ONLY)

1st IF

2nd IF

DETECTOR

IF AGC AMP

RF AGC AMP

T302 T304 T303

I 303 R324 10K

R325 SEE NOTE

R328 12K C328 .05

C326 .047μf C341 100μf R321 22 C325 .047μf

R320 10 C340 .047μf C376 .1μf

R323 15K Q304 R326 6.8K C331 .05μf R329 470 C327 .05μf

R319 47K I 301 E C323 .05μf

R331 1.1K R327 910 I 301 D R330 56 C322 1000

TP302 TP303 TP304

R332 68K I 304 B R333 21.5K 1% C335 3.3μf R334 32.4K 1%

C321 .33μf

R340 100K C367 1μf C368 1μf

CR305 R336 10K CR313 RC

R335 3.9K C324 220 I 304 A R341 3.6K R354 10K C386 220 C385 220

C389 1μf R337 13K ↻CW R338 5K R339 8.2K C387 220 R342 4.3K C388 220 R380 10K

J301

IF AGC 5

SQ TEST 4

RECEIVER OUTPUT 3

IF

SQUELCH GATE I301 A I301 B

R367 1.6K C380 6.8μf

R356 1K

R349 4.7K C333 1000 I302 D TP306 C332 4.7μf I302 C

R344 4.7K CR307 CR306 RC

R345 27K R346 20K

R357 680 I302 B I302 A

R359 2K CR310 C342 47μf

R347 430 CR309 TRANSMIT

C334 1000 R351 51K R352 11K R350 910 L309

C369 .02μf R348 500 ↻CW R361 4.7K

SQUELCH

I302 E L310

C336 1μf R355 200 C337 .22μf C338 .05μf

R353 1K R358 1.5K C339 .22μf

CLIMAX FILTER

E301 SMO OUTPUT E301

E302

.1V/DIV.-V(AC)
≈.2ms/DIV-H
100μV HARD/
30% 1KHz MOD.

1.0 ms .54V p-p

.5V/DIV.-V(AC)
.2ms/DIV-H
100μV HARD/30%
MOD.@ 1KHz

1.0 ms 2.5V p-p

.2V/DIV.-V(AC)
.2ms/DIV-H
100μV HARD/30%
@1KHz MOD.

1.0 ms 1V p-p

.1V/DIV.-V
50μs/DIV.-H
100μV HARD/85%
MOD @ 8KHz

125μs .42V p-p

NAME	ASS'Y. NO.
Display Board	200-6044-00

KING RADIO CORP. PARTS LISTING

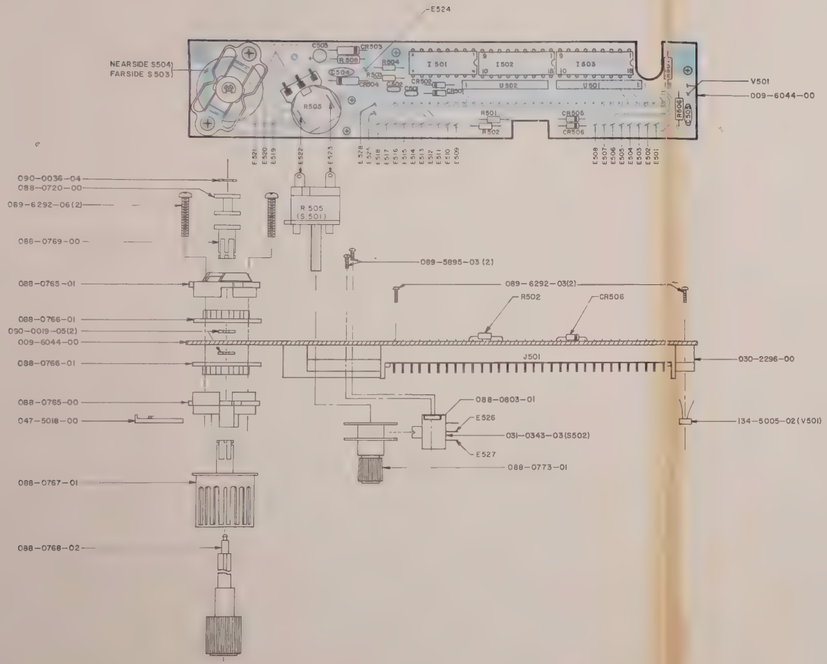
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-6044-00	Display PC Board		1				
	016-1040-00	Post Coating		AR				
	025-0001-00	Wire #26 Black		AR				
	025-0001-06	Wire #26 Blue		AR				
	047-5018-00	Spring		1				
	088-0720-00	Spool		1				
	088-0765-00	Housing		1				
	088-0765-01	Housing		1				
	088-0766-01	Wheel Detent		2				
	088-0767-01	Knob		1				
	088-0768-02	Knob and Shaft		1				
	088-0769-00	Sleeve		1				
	088-0773-01	Knob Volume		1				
	088-0803-01	Housing Switch		1				
	089-5895-03	Screw P.H. (0-80x3/16)		2				
	089-6292-06	Screw P.H. (2-56x3/8)		2				
	089-6292-03	Screw P.H. (2-56x3/16)		2				
	090-0019-05	Retaining Ring		2				
	090-0036-04	Retaining Ring		1				
CR501	007-6016-00	Diode 1N4154		2				
CR502	007-6016-00	Diode 1N4154		-				
CR503	007-5045-15	Diode ¼M9.1Z5		1				
CR504	007-5046-07	Diode 1N5271		1				
CR505	007-6105-00	Diode FDH444		2				
CR506	007-6105-00	Diode FDH444		-				
U501	015-0046-01	Res/Dio Module		1				
U502	XXX-XXXX-XX	Res Module 220K		AR				
	015-0041-01	Res Module 220K Reqd. when 120-3083-00 is used. Not Reqd. for, but may be used with 120-0095-00.						
S502	031-0343-03	Squelch Test Switch		1				
J501	030-2296-00	Display Connector		1				
C501	111-0001-33	Cap MC 330pf 200V 20%		2				
C502	111-0001-33	Cap MC 330pf 200V 20%		-				
C503	096-1082-17	Cap T 6.8uf 15V		1				
C504	114-7203-00	Cap DC .02uf 200V		2				
C505	114-7203-00	Cap DC .02uf 200V		-				

NAME	Display Board	ASS'Y. NO.	200-6044-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
I501	120-6045-01	IC SCL4022 AC+		1				
I502	XXX-XXXX-XX	IC Anode Driver		1				
	120-0095-00	IC UDN6184A Does Not Require 015-0041-01		AR				
	120-3083-00	IC DI512 Also Requires 015-0041-01		AR				
I503	120-0089-00	IC DS8884A		1				
R501	130-0824-13	Res FC 820K EW 5%		4				
R502	130-0824-13	Res FC 820K EW 5%		-				
R503	130-0824-13	Res FC 820K EW 5%		-				
R504	130-0824-13	Res FC 820K EW 5%		-				
R505	031-0353-00	Switch and Pot 25K		1				
R506	130-0134-23	Res FC 130K QW 5%		1				
R507	130-0913-23	Res FC 91K QW 5%		1				
R508	130-0823-23	Res FC 82K QW 5%		1				
V501	134-5005-02	Photo Detector		1				

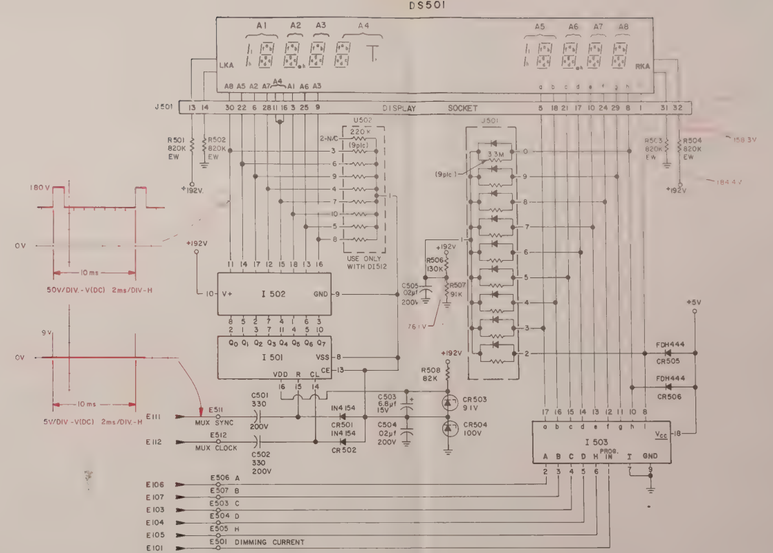
PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME: Display Board				ASS'Y. NO.: 200-6044-00
ASS'Y. DWG.: 300-6044-00			UNIT: KY 196/196E KY 197/197E	USED ON: 064-1019-00/01 064-1021-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978



NOTES:

1. INSTALL SPRING (047-5018-00) ON HOUSING (088-0765-00) AFTER SWITCH IS ASSEMBLED ON THE P.C. BOARD.
2. PRIOR TO POST COATING BOTH SIDES OF ASSY WITH CLEAR URETHANE COATING (016-1040-00) MASK OFF THE FOLLOWING: ALL MOUNTING AREAS, E 501 THRU E 528, S 501 THRU S 504, J 501, V 501.

WIRING CHART			
FROM	TO	KING PART NO	LENGTH
E 526	E 525	025-0001-00	250
E 527	E 528	025-0001-06	400



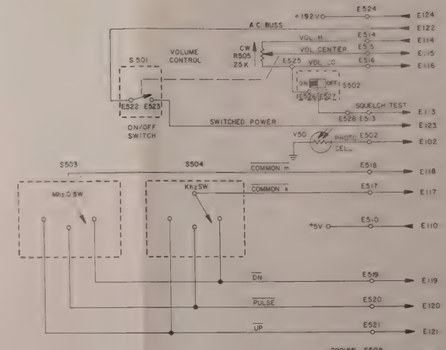


FIGURE 6-11 DISPLAY BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-6044-00, R-0)
(Dwg. No. 002-6044-00, R-0)

NAME	ASS'Y. NO.
Transmitter Board	200-6047-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-6047-00	Xmitter P/C Board		1				
	016-1004-00	Thermal Compound		AR				
	025-0004-00	Wire 20 AWG Blk		AR				
	025-0004-03	Wire 20 AWG Orn		AR				
	025-0004-13	Wire 20 AWG Orn/Wht		AR				
	025-0018-89	Wire 26 AWG Gry/Wht		AR				
	026-0003-00	Wire #22 Tinned Copper		AR				
	026-0004-00	Wire #20 Tinned Copper		AR				
	026-0013-00	Coax Cable RG 178 B/U		AR				
	030-0152-00	Conn BNC		1				
	073-0389-02	XMTR Heatsink		1				
	089-2013-37	Nut 6-32		1				
	089-5903-04	Screw PH 4-40 x 1/4		6				
	089-6293-04	Screw PH 3-48 x 1/4		6				
	089-8016-37	Washer Intl Lk #6		1				
	089-8033-30	Lock Washer		1				
	090-0091-00	Heatsink		1				

NAME	ASS'Y. NO.
Transmitter Board	200-6047-00

KING RADIO CORP. PARTS LISTING

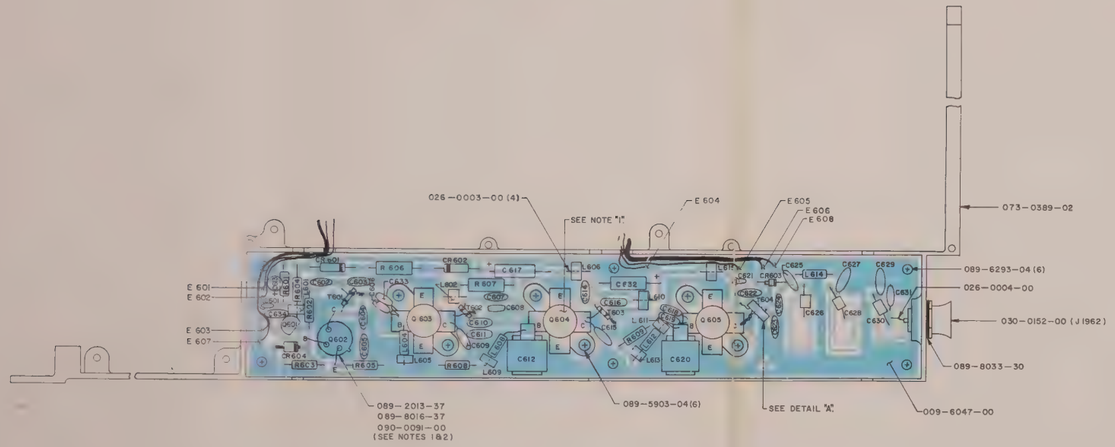
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
Q601	007-0195-00	Tstr MPSH10		1				
Q602	007-0066-00	Tstr 2N3866		1				
Q603	007-0337-00	Tstr SD1220-1		1				
Q604	007-0338-00	Tstr SD1222-5		1				
Q605	007-0249-00	Tstr SD1019-2		1				
CR601	007-6025-00	Diode 1N4003		2				
CR602	007-6025-00	Diode 1N4003		-				
CR603	007-6099-00	Diode UM9401		1				
CR604	007-6070-00	Diode MPN3401		1				
L601	013-0006-01	Ferrite Bead		9				
L602	013-0006-01	Ferrite Bead		-				
L603	NOT USED							
L604	019-2084-01	Choke .15uh		2				
L605	013-0006-01	Ferrite Bead		-				
L606	013-0006-01	Ferrite Bead		-				
L607	NOT USED							
L608	019-2084-01	Choke .15uh		-				
L609	013-0006-01	Ferrite Bead		-				
L610	013-0006-01	Ferrite Bead		-				
L611	013-0006-01	Ferrite Bead		-				
L612	019-2099-00	Choke .047uh		1				
L613	013-0006-01	Ferrite Bead		-				
L614	019-2084-29	Choke 2.2uh		1				
L615	013-0006-01	Ferrite Bead		-				
T601	019-3026-00	Transformer		2				
T602	019-3026-00	Transformer		-				
T603	019-3026-02	Transformer		1				
T604	019-3086-00	Transformer		1				
C601	111-0001-10	Cap MC .0039uf		1				
C602	113-5301-00	Cap D/C 300pf		1				
C603	104-0001-22	Cap M DM 330pf		1				
C604	113-3047-00	Cap D/C 4.7pf		2				
C605	104-0001-23	Cap M DM 270pf		3				
C606	104-0001-44	Cap M DM 56pf		2				

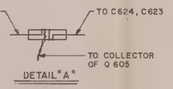
NAME	ASS'Y. NO.
Transmitter Board	200-6047-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C607	113-5102-00	Cap D/C 1000pf		2				
C608	104-0001-23	Cap M DM 270pf		-				
C609	113-3200-00	Cap D/C 20pf		1				
C610	104-0001-09	Cap M DM 47pf		3				
C611	104-0001-09	Cap M DM 47pf		-				
C612	100-0002-17	Cap UW 300pf		1				
C613	096-1082-02	Cap T 1.0uf 35V		1				
C614	104-0001-23	Cap M DM 270pf		-				
C615	113-3047-00	Cap 4.7pf		-				
C616	111-0001-22	Cap MC .1uf 100V		1				
C617	096-1056-00	Cap AL 1uf 75V		2				
C618	104-0001-44	Cap M DM 56pf		-				
C619	104-0001-35	Cap M DM 68pf		1				
C620	100-0002-19	Cap UW 500pf		1				
C621	111-0001-21	Cap MC .0068uf 100V		1				
C622	113-5102-00	Cap D/C 1000pf		-				
C623	104-0001-45	Cap M DM 43pf		2				
C624	104-0001-09	Cap M DM 47pf		-				
C625	113-3120-00	Cap D/C 12pf		2				
C626	106-0001-03	Cap MUD 1.5pf		1				
C627	113-3220-00	Cap D/C 22pf		2				
C628	106-0001-42	Cap MUD 9.1pf		1				
C629	113-3220-00	Cap D/C 22pf		-				
C630	106-0001-34	Cap MUD 6.8pf		1				
C631	113-3120-00	Cap D/C 12pf		-				
C632	096-1056-00	Cap AL 1uf 75V		-				
C633	104-0001-45	Cap M DM 43pf		-				
C634	113-5101-00	Cap D/C 100pf		1				
R601	130-0333-23	Res F/C 33K QW 5%		1				
R602	130-0222-23	Res F/C 2.2K QW 5%		1				
R603	130-0681-23	Res F/C 680 QW 5%		1				
R604	130-0100-23	Res F/C 10 QW 5%		2				
R605	130-0100-23	Res F/C 10 QW 5%		-				
R606	132-0106-24	Res WW 7.5 2 1/4W 5%		2				
R607	132-0106-24	Res WW 7.5 2 1/4W 5%		-				
R608	130-0027-23	Res F/C 2.7 QW 5%		2				
R609	130-0027-23	Res F/C 2.7 QW 5%		-				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Transmitter Board				ASS'Y. NO. 200-6047-00
ASS'Y. DWG. 300-6047-00			UNIT KY 196/196E	USED ON 064-1019-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978

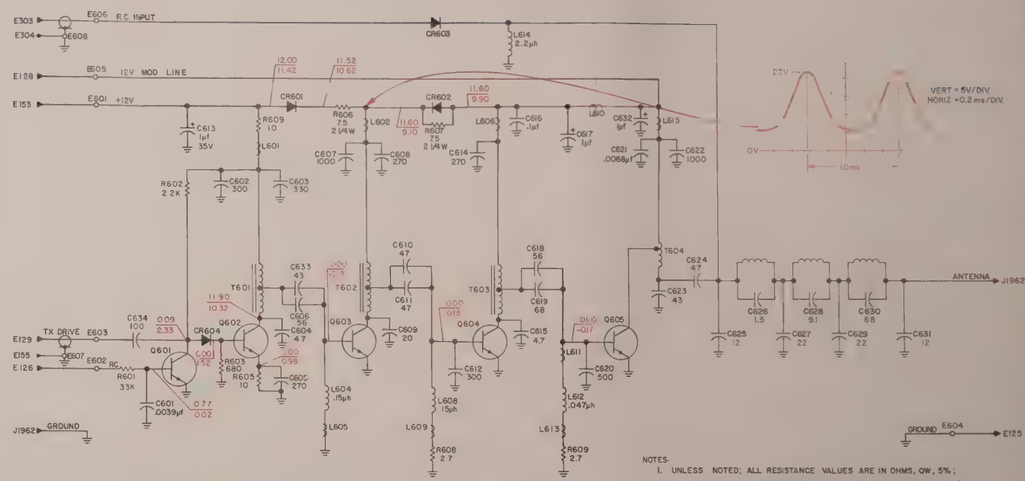




NOTES

1. APPLY THERMAL COMPOUND (016-1004-00) TO BACK SIDE OF TRANSISTORS, Q 603, Q 604, Q 605 ONLY AND TO BACK SIDE OF HEATSINK. ON Q 602 ADD THERMAL COMPOUND TO TRAN. CASE AND THE STUD SIDE OF THE HEATSINK.
2. TORQUE NUT ON FAR SIDE OF Q 602 TO 7 IN. POUNDS AND APPLY GLYPTAL.
3. ALL LEAD LENGHTS MUST BE AS SHORT AS POSSIBLE. SOLDER JOINTS ON CAPACITOR LEADS SHOULD EXTEND ALL THE WAY TO THE BODY OF THE CAPACITOR WHERE POSSIBLE.
4. ENTIRE ASS'Y MUST BE ESPECIALLY CLEAN AND FREE OF FLUX DEPOSITS.
5. MAINTAIN MINIMUM LEAD LENGTHS ON C 604, C 605, C 606, C 609, C 610, C 611, C 615, C 618, C 619, C 623, C 624, C 633, C 644.

WIRING CHART		
FROM	TO	PART NO.
E 601	E 153	025-0004-03
E 602	E 126	025-0018-89
E 603 E 607	E 129 E 155	026-0013-00
E 604	E 125	025-0004-00
E 605	E 128	025-0004-13
E 606 E 608	E 303 E 304	026-0013-00



NOTES:
1. UNLESS NOTED; ALL RESISTANCE VALUES ARE IN OHMS, 0W, 5%; ALL CAPACITANCE VALUES ARE IN PICOFARADS (pf).
2. VOLTAGES ABOVE LINE, REC MODE
VOLTAGES BELOW LINE, XMIT MODE
VOLTAGES TAKEN WITH FLUKE 2000A.

FIGURE 6-12 KY 196/196E TRANSMITTER BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-6047-00, R-0)
(Dwg. No. 002-6047-00, R-0)

NAME	ASS'Y. NO.
Transmitter Board	200-6166-00

KING RADIO CORP. PARTS LISTING

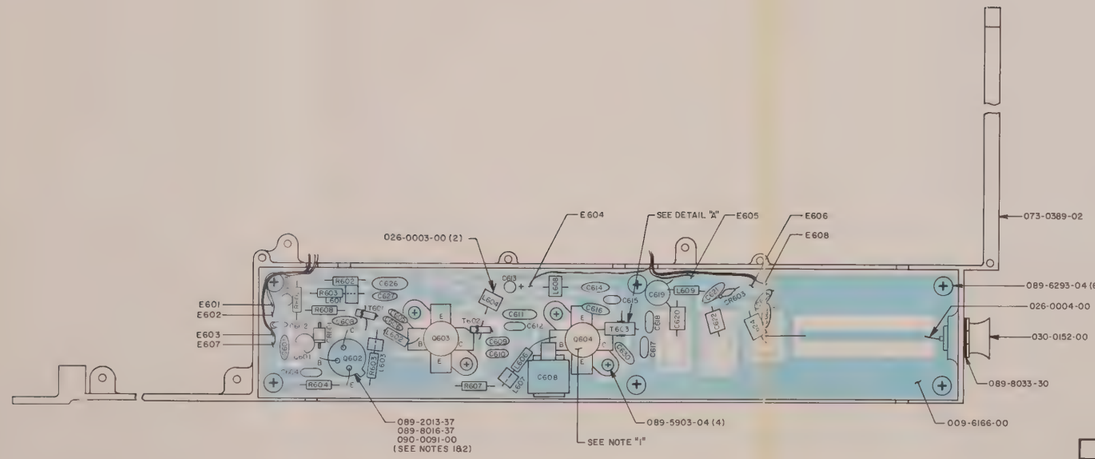
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-6166-00	XMTR PC Bd		1				
	016-1004-00	Thermal Compound		AR				
	025-0004-00	Wire 20 AWG Blk		AR				
	025-0004-03	Wire 20 AWG Orn		AR				
	025-0004-13	Wire 20 AWG Orn/Wht		AR				
	025-0018-89	Wire 26 AWG Gry/Wht		AR				
	026-0003-00	Wire #22 Tinned Copper		AR				
	026-0004-00	Wire #20 Tinned Copper		AR				
	026-0013-00	Coax Cable RG 178B/U		AR				
	030-0152-00	Conn BNC		1				
	073-0389-02	XMTR Heatsink		1				
	089-2013-37	Nut 6-32		1				
	089-5903-04	Scr PH 4-40 x 1/4		4				
	089-6293-04	Scr PH 3-48 x 1/4		6				
	089-8016-37	Washer Intl Lk #6		1				
	089-8033-30	Lock Washer		1				
	090-0091-00	Heatsink		1				
Q601	007-0195-00	TSTR MPSH10		1				
Q602	007-0250-00	TSTR 2N4427		1				
Q603	007-0360-00	TSTR SRF2444		1				
Q604	007-0361-00	TSTR SRF2445		1				
CR601	007-6070-00	DIO MPN3401		1				
CR602	Not Used							
CR603	007-6099-00	DIO UM9401		1				
L601	013-0006-01	Ferrite Bead		5				
L602	019-2099-00	Choke .047uh		2				
L603	013-0006-00	Ferrite Bead		-				
L604	013-0006-00	Ferrite Bead		-				
L605	Not Used							
L606	019-2099-00	Choke .047uh		-				
L607	013-0006-01	Ferrite Bead		-				
L608	013-0006-01	Ferrite Bead		-				
L609	019-2084-29	Choke 2.2uh		1				

NAME	ASS'Y. NO.
Transmitter Board	200-6166-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
T601	019-3026-02	XFMR		2				
T602	019-3026-02	XFMR		-				
T603	019-3086-00	XFMR		1				
C601	113-5101-00	CAP D/C 100pf		1				
C602	111-0001-10	CAP MC .0039uf		1				
C603	096-1082-02	CAP T 1.0uf 35V		2				
C604	104-0001-23	CAP MDM 270pf		3				
C605	104-0001-35	CAP MDM 68pf		2				
C606	104-0001-09	CAP MDM 47pf		1				
C607	Not Used							
C608	100-0002-17	CAP UW 300pf		1				
C609	104-0001-35	CAP MDM 68		-				
C610	104-0001-44	CAP MDM 56pf		1				
C611	104-0001-22	CAP MDM 330pf		2				
C612	104-0001-23	CAP MDM 270pf		-				
C613	096-1082-02	CAP T 1.0uf 35V		-				
C614	113-5102-00	CAP D/C 1000pf		1				
C615	104-0001-23	CAP MDM 270pf		-				
C616	Not Used							
C617	104-0002-09	CAP MDM 50pf		1				
C618	104-0001-02	CAP MDM 91pf		1				
C619	113-3120-00	CAP D/C 12pf		2				
C620	106-0001-03	CAP MUD 1.5pf		1				
C621	113-3220-00	CAP D/C 22pf		2				
C622	106-0001-42	CAP MUD 9.1pf		1				
C623	113-3220-00	CAP D/C 22pf		-				
C624	106-0001-34	CAP MUD 6.8pf		1				
C625	113-3120-00	CAP D/C 12pf		-				
C626	104-0001-22	CAP MDM 330pf		-				
C627	113-5301-00	CAP D/C 300pf		1				
C628	113-3047-00	CAP D/C 4.7pf		1				
C629	Not Used							
C630	104-0001-08	CAP MDM 75pf		1				
R601	130-0333-23	RES F/C 33K QW 5%		1				
R602	130-0202-23	RES F/C 2K QW 5%		1				
R603	130-0100-23	RES F/C 10 QW 5%		2				
R604	130-0100-23	RES F/C 10 QW 5%		-				
R605	130-0027-23	RES F/C 2.7 QW 5%		2				
R606	Not Used							
R607	130-0027-23	RES F/C 2.7 QW 5%		-				
R608	130-0681-23	RES F/C 680 QW 5%		1				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL Roger Manning
NAME TRANSMITTER BOARD				ASS'Y. NO. 200-6166-00
ASS'Y. DWG. 300-6166-00			UNIT KY 197/197E	USED ON 064-1021-00/01
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
				KY 196/196E/KY 197/197E Maintenance Manual Rev. 0, May, 1978



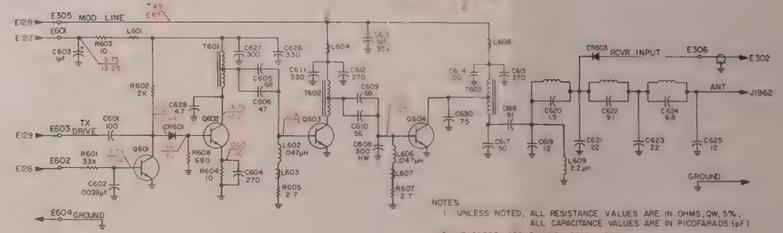
NOTES

1. APPLY THERMAL COMPOUND (016-1004-00) TO BACK SIDE OF TRANSISTORS, Q603, Q604 ONLY AND TO BACK SIDE OF HEATSINK. ON Q602 ADD THERMAL COMPOUND TO TRANSISTOR CASE AND THE STUD SIDE OF THE HEATSINK.
2. TORQUE NUT ON FAR SIDE OF Q602 TO 7 IN. POUNDS AND APPLY GLYPTAL.
3. ALL LEAD LENGTHS MUST BE AS SHORT AS POSSIBLE. SOLDER JOINTS ON CAPACITOR LEADS SHOULD EXTEND ALL THE WAY TO THE BODY OF THE CAPACITOR WHERE POSSIBLE.
4. ENTIRE ASS'Y MUST BE ESPECIALLY CLEAN AND FREE OF FLUX DEPOSITS.
5. MAINTAIN MINIMUM LEAD LENGTHS ON C605, C606, C609, C610, C617, C618, AND C628.

Q601

DETAIL "A"

WIRING CHART		
FROM	TO	PART NUMBER
E601	E153	025-0004-03
E602	E126	025-0018-89
E603 E607	E129 E155	026-0013-00
E604	E125	025-0004-00
E605	E128	025-0004-13
E606 E608	E303 E304	026-0013-00



NOTES

1. UNLESS NOTED, ALL RESISTANCE VALUES ARE IN OHMS, QW, 5%, ALL CAPACITANCE VALUES ARE IN PICOFARADS (pF)
2. •VOLTAGES ABOVE LINE: RCVR MODE.
   •VOLTAGES BELOW LINE: XMTR MODE.
   •VOLTAGES TAKEN WITH FLUKE 2000A

FIGURE 6-13 KY 197/197E TRANSMITTER BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-6166-00, R-0)
(Dwg. No. 002-6166-00, R-0)

KPN 006-3001-06

Manufactured By
KING
PRINTING DIVISION

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SEMICONDUCTOR AND INTEGRATED CIRCUIT DATA

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1.1 GENERAL

Due to the wide utilization of semiconductors in this electronic equipment, somewhat different techniques are necessary in maintenance procedures. In solid state circuits the impedances and resistances encountered are of much lower values than those encountered in vacuum-tube circuits. Therefore, a few ohms discrepancy can greatly affect the performance of the equipment. Also, coupling and filter capacitors are of larger values and usually are of the tantalum type. Hence, when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capacitor polarity must be observed when measuring resistance. Usually more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuits.

1.1.1 SEMICONDUCTOR TEST EQUIPMENT

Damage to semiconductors by test equipment is usually the result of accidentally applying too much voltage to the elements. Common causes of damage from test equipment are discussed in the following paragraph.

A. Transformerless Power Supplies

Test equipment with transformerless power supplies is one source of high current. However, this type of test equipment can be used by employing an isolation transformer in the AC power line.

B. Line Filter

It is still possible to damage semiconductors from line current, even though the test equipment has a power transformer in the power supply, if the test equipment is provided with a line filter. This filter may function as a voltage divider and apply half voltage to the semiconductor. To eliminate this condition, connect a ground wire from the chassis to the test equipment to the chassis of the equipment under test before making any other connections.

C. Low-Sensitivity Multimeters

Another cause of semiconductor damage is a multimeter that requires excessive current to provide adequate indications. Multimeters with sensitivities of less than 20,000 ohms-per-volt should not be used on semiconductors. When in doubt as to the amount of current supplied by a multimeter, check the multimeter circuits on all scales with an external, low-resistance multimeter connected in series with the multimeter leads. If more than one milliampere is drawn on any range, this range cannot be safely used on small semiconductors.

D. Power Supply

When using a battery-type power supply, always use fresh batteries of the proper value. Make certain that the polarity of the power supply is correct for the equipment under test. Do not use power supplies having poor voltage regulation.

1.1.2 SEMICONDUCTOR VOLTAGE AND RESISTANCE MEASUREMENTS

When measuring voltage or resistance in circuits containing semiconductor devices, remember that these components are polarity and voltage conscious. Since the values of capacitors used in semiconductor circuits are usually large, time is required to charge these capacitors when they appear. Thus, any reading obtained is subject to error if sufficient time is not allowed for the capacitor to fully charge. When in doubt it may be best in some cases to isolate the components in question and measure them individually.

1.1.3 TESTING OF TRANSISTORS

A transistor checker should be used to properly evaluate transistors. If a transistor tester is not available, a good multimeter may be used. Make sure that the multimeter meets the requirements outlined in the preceding paragraph.

A. PNP Transistor

To check a PNP transistor, connect the positive lead of the multimeter to the base of the transistor and the negative lead to the emitter or collector. Generally, a resistance reading of 50,000 ohms or more should be obtained. Reconnect the multimeter with the negative lead to the base. With the positive lead connected to the emitter or collector a resistance value of 500 ohms or less should be obtained.

B. NPN Transistor

Similar tests made on an NPN transistor should produce the following results:

With the negative lead of the multimeter connected to the base of the transistor the value of resistance between the base and the collector or emitter should be high. With the positive lead of the multimeter connected to the base, the value of resistance between the base and the collector or emitter should be low. If these results are not obtained, the transistor is probably defective and should be replaced.

CAUTION

IF A TRANSISTOR IS FOUND TO BE DEFECTIVE, MAKE CERTAIN THAT THE CIRCUIT IS IN GOOD OPERATING ORDER BEFORE INSTALLING A REPLACEMENT TRANSISTOR. IF A SHORT CIRCUIT EXISTS IN THE CIRCUIT, PUTTING IN ANOTHER TRANSISTOR WILL MOST LIKELY RESULT IN BURNING OUT THE NEW COMPONENT. DO NOT DEPEND UPON FUSES TO PROTECT TRANSISTORS.

C. Always check the value of the bias resistors in series with the various elements. A transistor is very sensitive to improper bias voltage; therefore, a short or open circuit in the bias resistors may damage the transistor.

1.1.4 REPLACING SEMICONDUCTORS

Never remove or replace a semiconductor with the supply voltage turned on. Transients thus produced may damage the semiconductor or others remaining in the circuit. If a semiconductor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the semiconductor than normally is used in the circuit from which it came.

A. Use only a low heat soldering iron when installing or removing soldered-in semiconductors. Grasp the lead to which heat is applied between the solder joint and the semiconductor with long nosed pliers.

This will dissipate some of the heat that would otherwise be conducted into the semiconductor from the soldering iron. Make certain that all wires soldered to semiconductor terminals have first been properly tinned so that the necessary connection can be made quickly. Excessive heat will permanently damage a semiconductor.

B. In some cases, power transistors are mounted on heat-sinks that are designed to dissipate heat away from them. In some power circuits, the transistor must also be insulated from ground. This insulating is accomplished by means of an insulating washer made of mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in proper order. After the transistor is mounted, and before making any connections, check from the case of the transistor to ground with a multimeter to see that the insulation is effective.

1.2 INTEGRATED CIRCUIT MAINTENANCE

1.2.1 GENERAL

A knowledge of integrated circuit fundamentals is as necessary in testing digital logic circuits involving IC's as a knowledge of rectification fundamentals is needed to test a power supply.

1.2.2 TERMINOLOGY

Several terms are used whenever logic circuits are discussed:

A. A logic state is defined as a high or low level voltage applied to the input or seen at the output of a device. A high level voltage is called a logic "1". A low level voltage is called a logic "0". Logic threshold voltage of a device is the input voltage required at an input to change the output state.

B. A truth table is a list of input logic states that will yield certain output logic states. A digital logic element should be thought of as a circuit element with its output level being either HI or LO as programmed by the levels present on its inputs.

A logic element may be tested by verifying that it is performing per the Truth Table of that logic element.

C. Logic elements which have multiple inputs and a single output are known as gates. The OR gate produces a HI output when one or more of the inputs are HI. With all inputs LO, the output is LO. The AND gate produces a HI output only when all inputs are HI. When any input is LO the output is LO. A small circle at the output of a gate on the schematics indicates "negation", which means that the sense of the gate logic is reversed. An OR gate with negation is called a NOR gate and an AND gate with negation is called a NAND gate. A NOR gate produces a LO output when one or more of the inputs are HI and a NAND gate produces a LO output only when all inputs are HI.

D. The Flip-Flop logic element is the basic data storage element of digital logic. It has two outputs that are always at opposite logic levels. That is, when one output is HI the other is LO. The Flip-Flop will remain in a particular state until that state is changed by an input signal.

The operation of these Flip-Flops is controlled by the signals on their inputs, and is best understood by a careful study of their Truth Tables. It should be kept in mind that a small circle on either the input or the output indicates negation. Also, a circle on a clock input indicates that a HI to LO transition causes the Flip-Flop to function.

E. Besides the gates and Flip-Flops, two other commonly used logic elements are inverters and expanders. Inverters are merely switching transistors such that if a logic "1" is the input to a device, a logic "0" will be the output and vice-versa. An expander is a set of parallel switching transistors that depends upon another resistor to provide their supply voltage. Generally, these devices are used to expand the number of inputs available to a standard gate.

1.2.3 INTEGRATED CIRCUIT TEST EQUIPMENT

As with semiconductors, damage to integrated circuits by test equipment is usually the result of applying too much current or voltage to the elements. The same precautions as discussed in Paragraph 1.1.1 apply here.

1.2.4 VOLTAGE MEASUREMENTS

Precise voltage measurements are not needed in testing digital IC's other than to see that the voltage is a HI or a LO level. An oscilloscope is needed where the input levels are of short duration, either HI or LO. For instance, if a 10 microsecond pulse going from LO to HI was applied to one input of a NOR gate, while the other input stayed LO, the output would go LO for 10 microseconds and then return HI. This, of course, could not be seen without an oscilloscope.

1.2.5 TESTING INTEGRATED CIRCUITS

The fully loaded guaranteed minimum high and maximum low for the digital logic output levels are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.2V)	
High	Low	High	Low
2.4	0.5	4.25	3.48

The minimum high and maximum low input levels which are guaranteed to be correctly interpreted are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.2V)	
High	Low	High	Low
2.0	0.8	4.06	3.75

When checking input and output levels of a logic element under question it should be remembered that an input or output may not agree with its truth table not because it has malfunctioned but because some other component connected to the same point has shorted to ground or to the supply voltage (V_{CC}). This is not common when an output on one element is connected to an input of another. A majority of digital IC failures can be grouped into threee categories:

A. Input(s) or output shorted to ground pin of IC.

B. Input(s) or output shorted to V_{CC} pin of IC.

C. Open input(s) or output.

An input or output shorted to ground would be a constant LO and an input or output shorted to V_{CC} would be a constant HI.

Other failures common in digital IC's are:

A. Ground pin open.

B. V_{CC} pin open.

C. Inputs shorted together.

An open ground pin would not allow a LO on the output. An open V_{CC} pin would not allow a HI on the output. (Remember to isolate the device from other components connected to it). Two or more inputs shorted together can be checked by grounding one of the inputs under question. If the other input also goes to ground they are probably shorted.

CAUTION

IF AN IC IS FOUND TO BE DEFECTIVE, VERIFY THAT PROPER POWER SUPPLY VOLTAGES ARE PRESENT BEFORE INSTALLING A REPLACEMENT IC.

1.2.6 REPLACING INTEGRATED CIRCUITS

If an IC is known to be defective, the easiest way to remove it is to cut off each of its pins, remove the case, and then unsolder the remaining pins from the integrated circuit card one by one. This is preferrable over removing the IC intact because attempts to remove the IC intact may result in damage to the printed circuit board.

FIGURE 1. BUFFER

$Z = A$

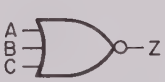
A	Z
0	0
1	1

FIGURE 2. INVERTER

$Z = \overline{A}$

A	Z
0	1
1	0

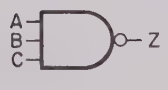
FIGURE 3. NOR GATE



$Z = \overline{A+B+C}$

A	B	C	Z
0	0	0	1
1	0	0	0
0	1	0	0
0	0	1	0
1	1	0	0
1	0	1	0
0	1	1	0
1	1	1	0

FIGURE 4. NAND GATE



$Z = \overline{ABC}$

A	B	C	Z
0	0	0	1
1	0	0	1
0	1	0	1
0	0	1	1
1	1	0	1
1	0	1	1
0	1	1	1
1	1	1	0

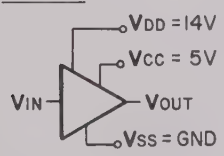
FIGURE 5. EXCLUSIVE OR GATE

$Z = A \oplus B$

A	B	Z
0	0	0
1	0	1
0	1	1
1	1	0

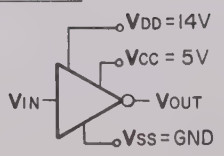
FIGURE 6. TTL TO CMOS VOLTAGE LEVEL TRANSLATORS

BUFFER



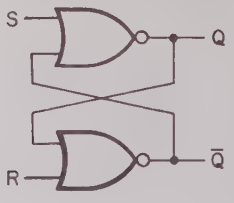
VIN	0V	14V
VOUT	0V	5V

INVERTER



VIN	0V	14V
VOUT	5V	0V

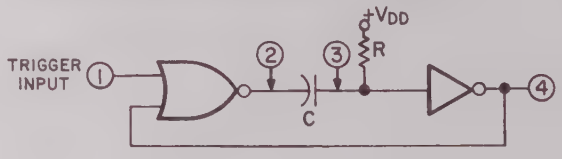
FIGURE 7. NOR GATE FLIP-FLOP



S	R	Next Q	$\bar{Q}$
1	1	0	0
0	1	1	0
0	0	NC	NC
1	0	0	1

NC = NO CHANGE

FIGURE 8. MONOSTABLE MULTIVIBRATOR (ONE-SHOT)



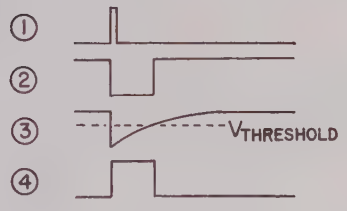
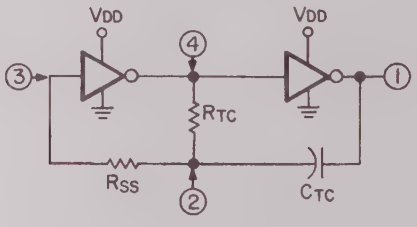
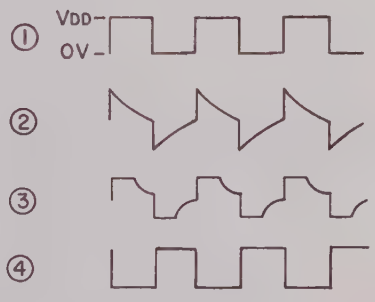


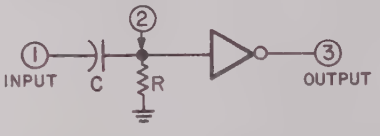
FIGURE 9. ASTABLE MULTIVIBRATOR (FREE-RUNNING)

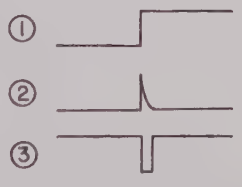




FREQUENCY OF OPERATION IS DETERMINED BY R_{TC} AND C_{TC}.
A NOR OR NAND GATE MAY BE USED IN PLACE OF THE FIRST INVERTER TO PERMIT GATING OF THE MULTIVIBRATOR.

FIGURE 10. DIFFERENTIATOR



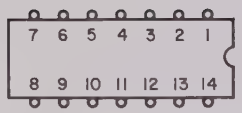


OFTEN USED TO CHANGE A STEP SIGNAL TO A SHORT PULSE SIGNAL.

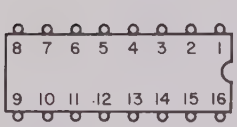
INTEGRATED CIRCUIT PIN LOCATION DIAGRAMS

(Viewed From TOP of IC)

(1)



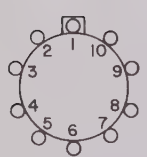
(2)



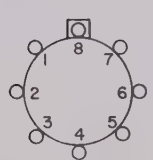
(3)

(4)

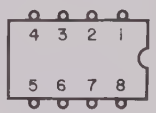
(5)



(6)

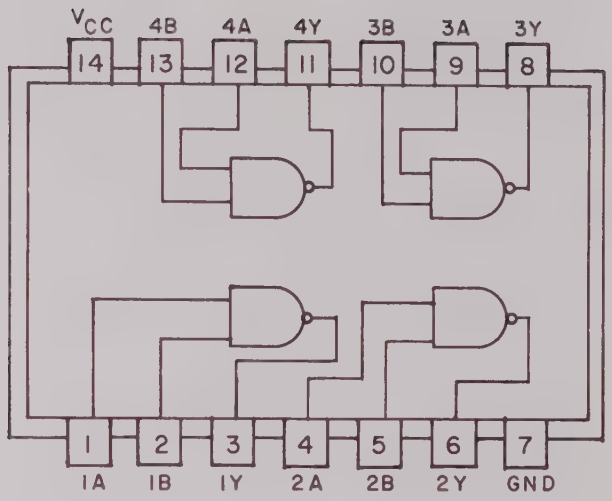


(7)



74LS00

120-0079-00



POSITIVE LOGIC $Y = \overline{AB}$

QUADRUPLE 2-INPUT POSITIVE-NAND GATES

DESCRIPTION

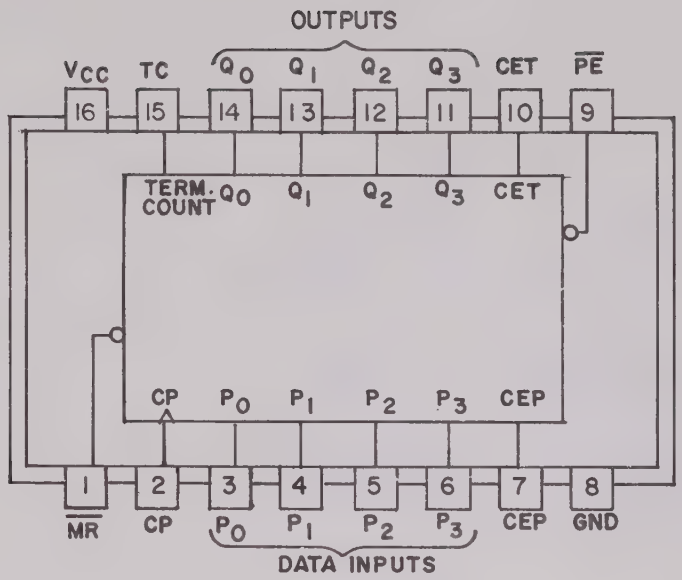
The transistor-transistor-logic (TTL) family of high-performance bipolar digital integrated circuits comprises five distinct series of compatible produce lines. These product lines offer the digital systems designer a full spectrum of performance ranges in order to optimize system cost and performance. The available choices range from the very high performance of the Schottky-clamped* functions for systems operating typically up to 125 megahertz to low-power functions with power consumption of only one milliwatt per gate.

74LS162

120-0087-00

74LS163

120-0088-00


OUTPUTS
VCC TC Q0 Q1 Q2 Q3 CET PE
16 15 14 13 12 11 10 9
TERM. COUNT Q0 Q1 Q2 Q3 CET
CP P0 P1 P2 P3 CEP
1 2 3 4 5 6 7 8
MR CP P0 P1 P2 P3 CEP GND
DATA INPUTS

BCD DECADE COUNTER/4-BIT BINARY COUNTER

FUNCTIONAL DESCRIPTION

The 74LS162 is a high speed BCD decade counter, and the 74LS163 is a high speed binary counter. Both counters are fully synchrounous will the clock pulse driving four master/slave flip-flops in parallel through a clock buffer.

The three control inputs, Parallel Enable ($\overline{PE}$), Count Enable Parallel (CEP), and Count Enable Trickle (CET), select the mode of operation as shown in the tables below. When the conditions for counting are satisfied, the rising edge of a clock pulse will change the counters to the next state of the count sequence shown in the State Diagram on the previous page. The Count Mode is enabled when CEP and CET inputs and $\overline{PE}$ are HIGH.

The 74LS162 and 74LS163 can be synchronously preset from the four Parallel inputs, (P_{0-3}) when $\overline{PE}$ is LOW. When the Parallel Enable and Clock are LOW, each master of the flip-flops is connected to the appropriate parallel input (P_{0-3}) and the slaves (outputs) are steady in their previous state. When the clock goes HIGH, the masters are inhibited and this information is transferred to the slaves and reflected at the outputs. The parallel enable input overrides both count enable inputs, presetting the counter when LOW.

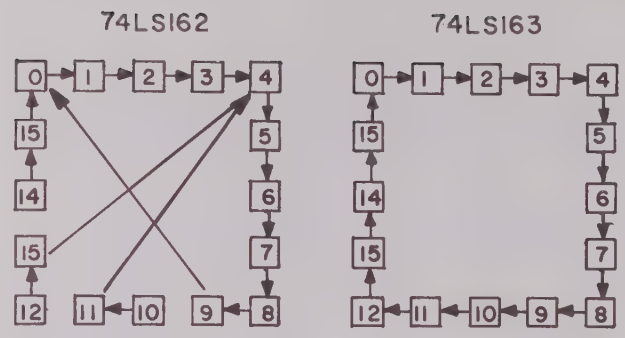
Terminal count is HIGH when the counter is at terminal count (state 9 for 74LS162, and state 15 for 74LS163), and Count Enable Trickle is HIGH, as is shown in the logic equations. When LOW, the asynchronous master reset overrides all other inputs resetting the four outputs LOW.

74LS162

120-0087-00

74LS163

120-0088-00



LOGIC EQUATIONS

COUNT ENABLE = $\overline{CEP} \cdot \overline{CET} \cdot \overline{PE}$

TC FOR 74LS162 = $CET \cdot Q_0 \cdot \overline{Q_1} \cdot \overline{Q_2} \cdot Q_3$

TC FOR 74LS163 = $CET \cdot Q_0 \cdot Q_1 \cdot Q_2 \cdot Q_3$

PRESET = $\overline{PE} \cdot CP$ + (RISING CLOCK EDGE)

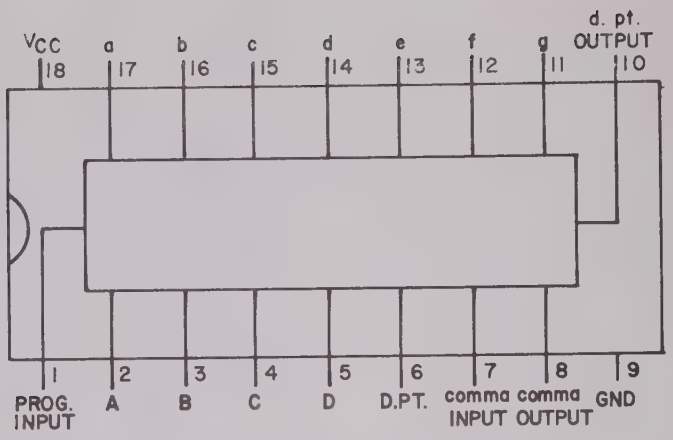
RESET = $\overline{MR}$

PIN NAMES

$\overline{PE}$	Parallel Enable (Active LOW) Input
P_0, P_1, P_2, P_3	Parallel Inputs
CEP	Count Enable Parallel Input
CET	Count Enable Trickle Input
CP	Clock (Active HIGH Going Edge) Input
$\overline{MR}$	Master Reset (Active LOW) Input
Q_1, Q_2, Q_3, Q_4	Parallel Outputs
TC	Terminal Count Outputs

DS8884

120-0089-00



TOP VIEW

FUNCTION	D.P.T.	COMMA	D	C	B	A	a	b	c	d	e	f	g	DISPLAY
0	1	1	0	0	0	0	0	0	0	0	0	0	1	
1	1	1	0	0	0	1	1	0	0	1	1	1	1	
2	1	1	0	0	1	0	0	0	1	0	0	1	0	
3	1	1	0	0	1	1	0	0	0	0	1	1	0	
4	1	1	0	1	0	0	1	0	0	1	1	0	0	
5	1	1	0	1	0	1	0	1	0	0	1	0	0	
6	1	1	0	1	1	0	0	1	0	0	0	0	0	
7	1	1	0	1	1	1	0	0	0	1	1	1	1	
8	1	1	1	0	0	0	0	0	0	0	0	0	0	
9	1	1	1	0	0	1	0	0	0	0	1	0	0	
10	1	1	1	0	1	0	1	1	0	0	0	1	1	
11	1	1	1	0	1	1	1	1	0	0	0	1	0	
12	1	1	1	1	0	0	0	0	1	1	1	0	0	
13	1	1	1	1	0	1	0	1	1	0	0	0	0	
14	1	1	1	1	1	0	1	1	1	1	1	1	0	
15	1	1	1	1	1	1	1	1	1	1	1	1	1	
* D.P.T.	0	1	X	X	X	X	X	X	X	X	X	X	X	
* Comma	0	0	X	X	X	X	X	X	X	X	X	X	X	

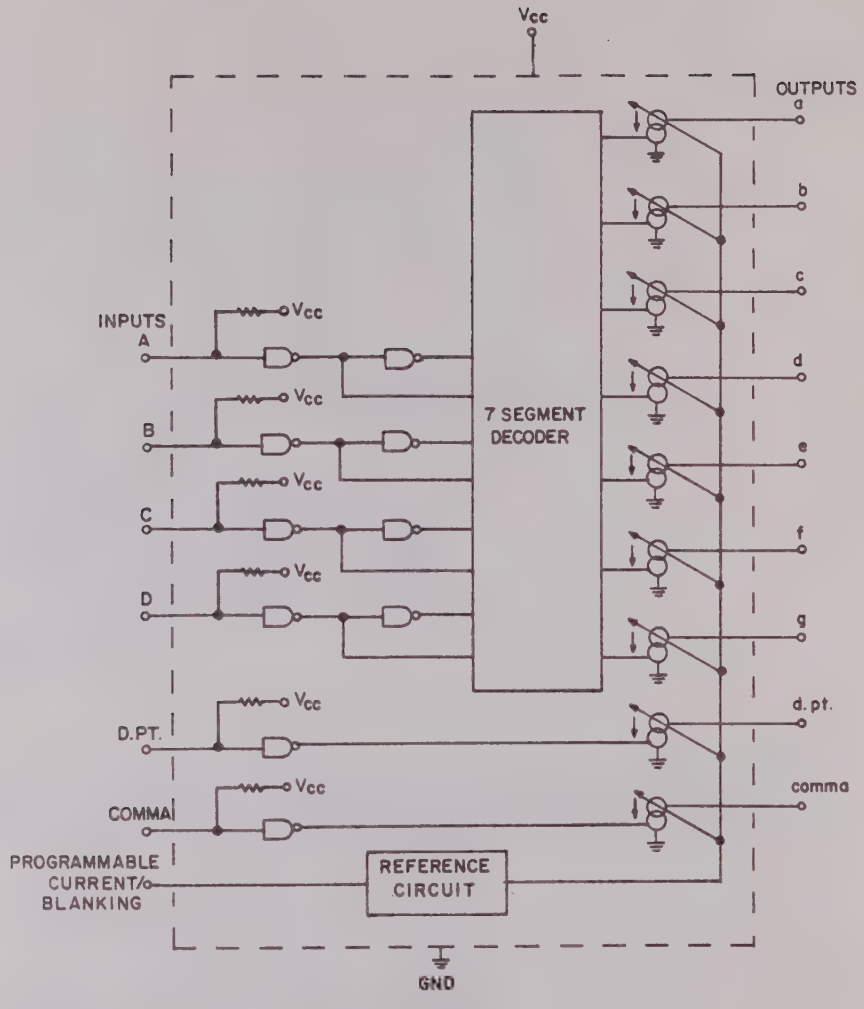
DECIMAL POINT

COMMA

* DECIMAL POINT AND COMMA CAN BE DISPLAYED WITH OR WITHOUT ANY NUMERAL.

DS8884

120-0089-00



LOGIC DIAGRAM

HIGH VOLTAGE CATHODE DECODER/DRIVER

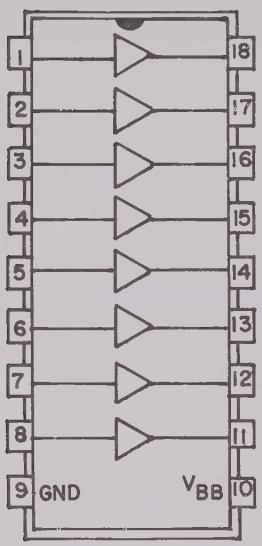
GENERAL DESCRIPTION

The DS8884A is designed to decode four lines of BCD input and drive seven-segment digits of gas-filled readout displays. Two separate inputs are provided for driving the decimal point and comma cathodes.

All outputs consists of switchable and programmable current sinks which provide constant current to the tube cathodes, even with high tube anode supply tolerance. Output currents may be varied over the 0.2 to 1.2ma range for multiplex operation. The output current is adjusted by connecting an external program resistor (R_p) from V_{CC} to the program input in accordance with the programming curve.

UDN6184A

120-0095-00



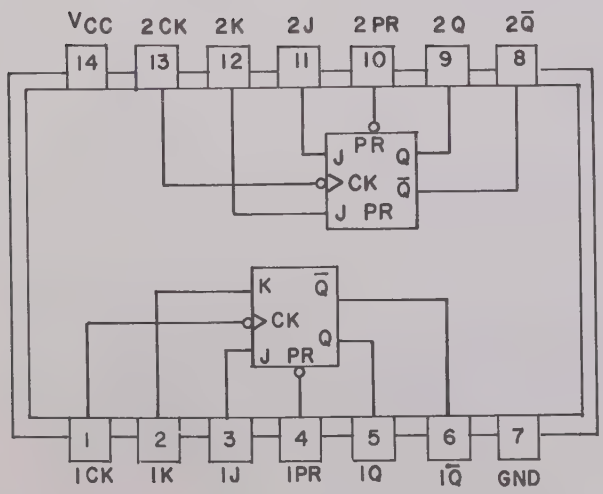
GAS DISCHARGE DISPLAY DIGIT DRIVERS

DESCRIPTION

Designed for interfacing between MOS, or other low-voltage circuitry, and the anode of gas discharge display panels, these monolithic high-voltage bipolar integrated circuits dramatically reduce the number of discrete components previously required. Each driver contains appropriate level shifting, signal amplification, output off state voltage bias, and 70ma output current sourcing for the sequential addressing of display panel anodes. The inputs include pull-down resistors for direct connection to open drain PMOS logic.

74LS113

120-0123-00



FUNCTION TABLE

INPUTS				OUTPUTS	
PRESET	CLOCK	J	K	Q	$\bar{Q}$
L	X	X	X	H	L
H	↓	L	L	Q_O	Q_O
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	TOGGLE	
H	H	X	X	Q_O	$\bar{Q}_O$

74LS113

120-0123-00

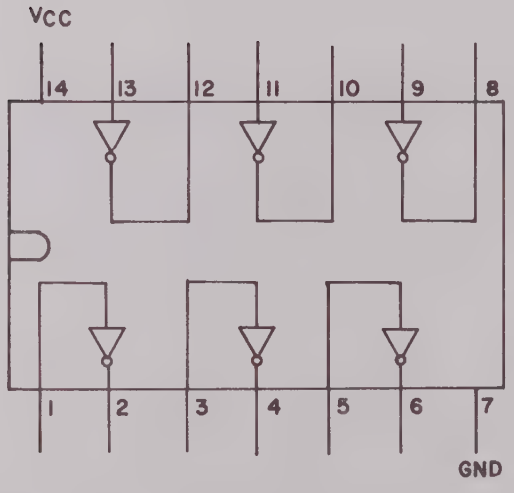
DUAL J-K FLIP-FLOPS WITH PRESET AND CLEAR

DESCRIPTION

The transistor-transistor-logic (TTL) family of high-performance bipolar digital integrated circuits comprises five distinct series of compatible product lines. These product lines offer the digital systems designer a full spectrum of performance ranges in order to optimize system cost and performance. The available choices range from the very high performance of the Schottky-clamped functions for systems operating typically up to 125 megahertz to low-power functions with power consumption of only one milliwatt per gate.

88L12

120-0125-00



TOP VIEW

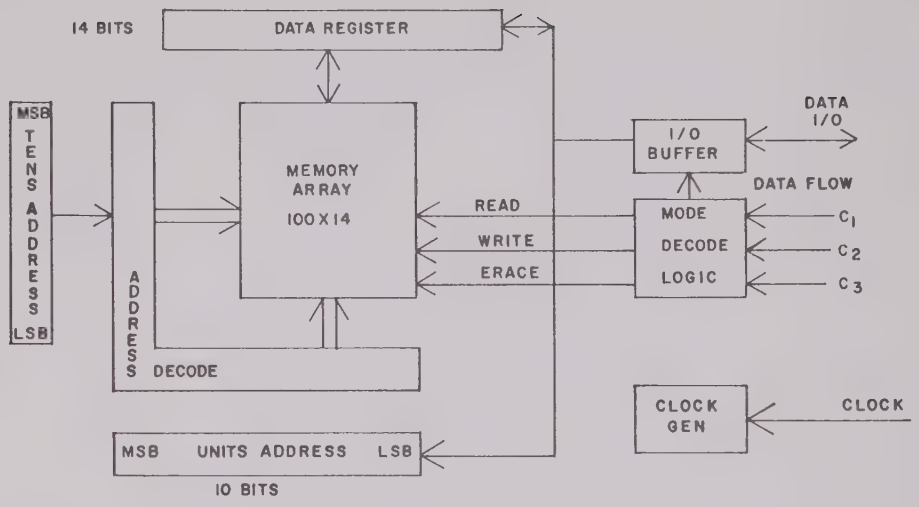
TTL-MOS HEX INVERTER/INTERFACE GATE

GENERAL DESCRIPTION

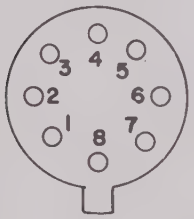
The DS78L12/DS88L12 is a low power TTL to MOS hex inverter element. The outputs may be "pulled up" to +14V in the logical "1" state, thus providing guaranteed interface between TTL and MOS logic levels. The gate may also be operated with V_{CC} levels up to +14V without resistive pull-ups at the outputs and still providing a guaranteed logical "1" level of V_{CC} - 2.2V with an output current of -200ua.

ER1400/1400T

120-2028-00

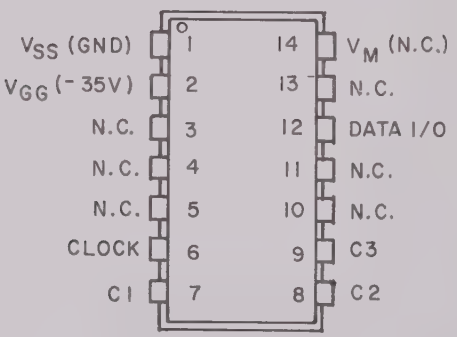


BOTTOM VIEW



1. DATA I/O
2. V_M
3. V_{SS}
4. V_{GG}
5. CLOCK
6. C1
7. C2
8. C3

TOP VIEW



1400 Bit Electrically Alterable Read Only Memory

DESCRIPTION

The ER1400 is a serial input/output 1400 bit electrically erasable and reprogrammable ROM, organized as 100 words of 14 bits each. Data and address are communicated in serial form via a one-pin bidirectional buss.

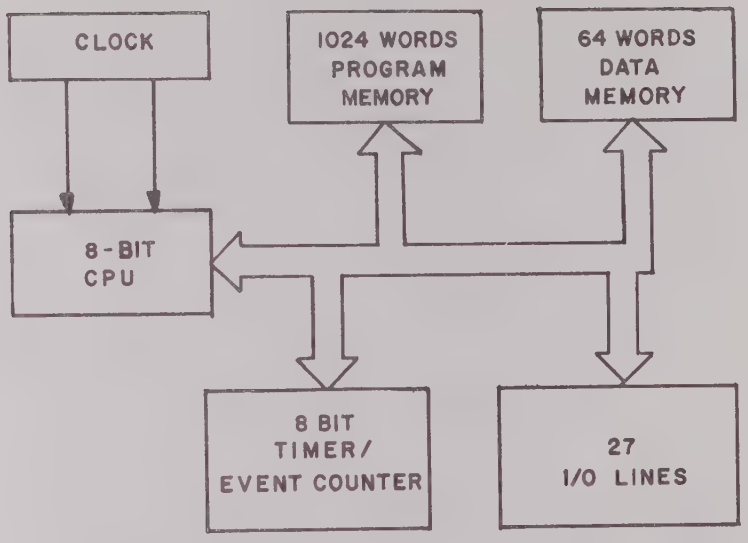
Addressing is by two consecutive one-of-ten codes.

Mode selection is by a 3 bit code applied to C1, C2 and C3.

Data is stored by internal negative writing pulses that selectively tunnel charge into the oxide-nitride interface of the gate insulator of the 1400 MNOS memory transistors. When the writing voltage is removed the charge trapped at the interface is manifested as a negative shift in the threshold voltage of the selected memory transistors.

8048

120-2032-00



8048 SINGLE COMPONENT 8-BIT MICROCOMPUTER

DESCRIPTION

This device is a totally self-sufficient 8-bit parallel computer fabricated on a single silicon chip using an N-channel silicon gate MOS process.

The 8048 contains a 1K x 8 program memory, a 64 x 8 RAM data memory, 271/O lines, and an 8-bit timer/counter in addition to on board oscillator and clock circuits. For systems that require extra capability, the 8048 can be expanded using standard memories and peripherals.

This microprocessor is designed to be an efficient controller as well as an arithmetic processor. The 8048 has extensive bit handling capability as well as facilities for both binary and BCD arithmetic. Efficient use of program memory results from an instruction set consisting mostly of single byte instructions and no instructions over two bytes in length.

MC1350P

120-3020-00

MONOLITHIC IF AMPLIFIER

...an integrated circuit featuring wide range AGC for use as an IF amplifier in radio and TV over the temperature range 0 to +75°C. The MC 1352 is similar in design but has a keyed-AGC amplifier as an integral part of the same chip.

Power Gain - 50dB typ. at 45MHz,
- 48dB typ. at 58MHz

AGC Range - 60dB min, DC to 45MHz

Nearly constant input and output admittance over the entire AGC range

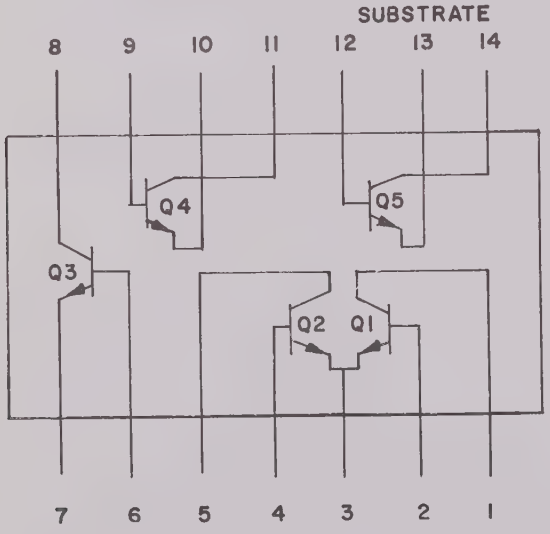
Y_{21} Constant (-3.0dB) to 90MHz

Low Reverse Transfer Admittance - 1.0umho typ.

12-Volt Operation, Single-Polarity Power Supply

CA3086

120-3029-000



GENERAL PURPOSE NPN TRANSISTOR ARRAY

Three Isolated Transistors and One Differentially-Connected Transistor Pair

For Low-Power Applications from DC to 120MHz

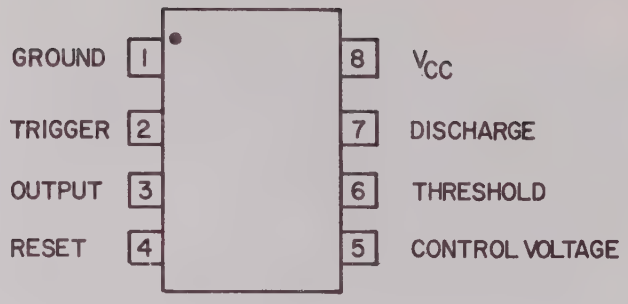
This device consists of five general purpose silicon NPN transistors on a common monolithic substrate. Two of the transistors are internally connected to form a differentially-connected pair.

The transistors are well suited to a wide variety of applications in low-power systems at frequencies from DC to 120MHz. They may be used as discrete transistors in conventional circuits. However, they also provide the very significant inherent advantages unique to integrated circuits, such as compactness, ease of physical handling and thermal matching.

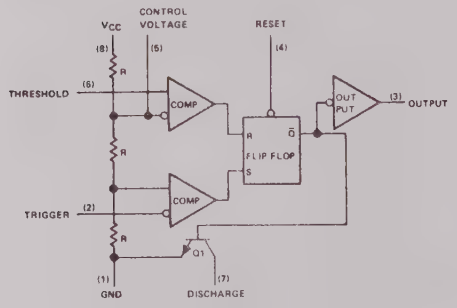
NE/SE555

120-3040-00/01

TOP VIEW



functional block diagram



LINEAR INTEGRATED CIRCUITS

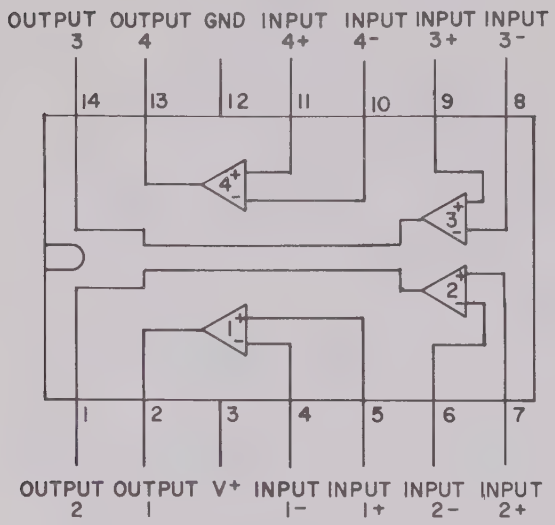
DESCRIPTION

The NE/SE 555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays, or oscillation. Additional terminals are provided for triggering or resetting if desired. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200ma or drive TTL circuits.

LM339

120-3048-00

DUAL-IN-LINE AND FLAT PACKAGE



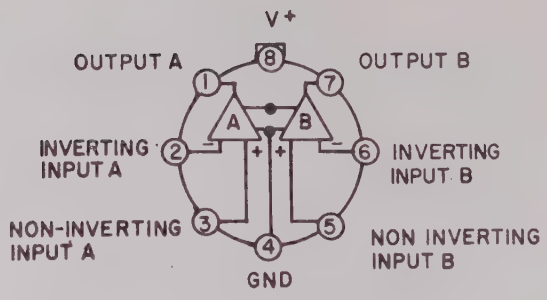
LOW POWER LOW OFFSET VOLTAGE QUAD COMPARATORS

The LM339 consists of four independent voltage comparators which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

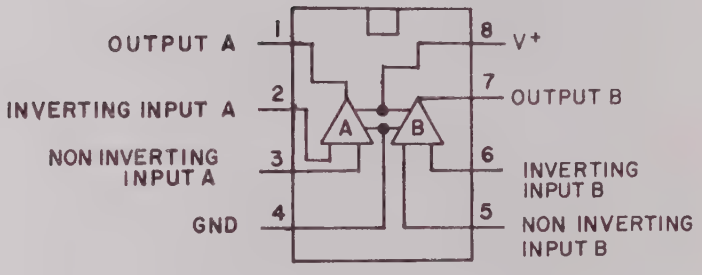
LM358

120-3053-00

METAL CAN PACKAGE



DUAL-IN-LINE PACKAGE

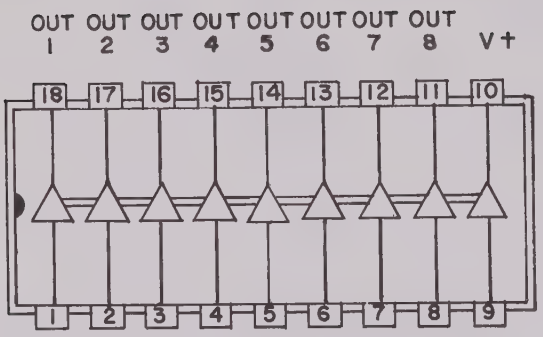


LOW POWER DUAL OPERATIONAL AMPLIFIERS

The LM358N consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

D1512

120-3083-00



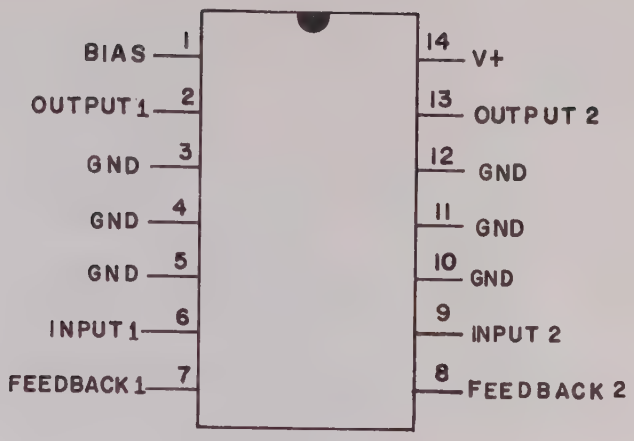
PIN CONNECTIONS

Level-Shifted Gas Discharge Display Digit Drivers

The DIONICS DI-502/507/512 series circuits are designed for interfacing between MOS or TTL circuitry and gas discharge display panels. Each section of these devices is made up of a switched constant current level shifter - capable of high voltage operation - and a PNP-NPN driver transistor pair. The constant current operation of the level shifter stage results in low power dissipation. Input circuitry is suitable for open drain PMOS, CMOS, open-collector or standard TTL.

LM378

120-3088-00



TOP VIEW

Dual 4 Watt Audio Amplifier

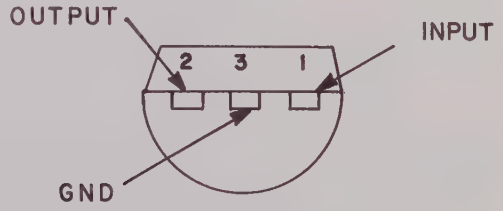
GENERAL DESCRIPTION

The LM378 is a monolithic dual power amplifier which offers high quality performance for stereo phonographs, tape players, recorders, and AM-FM stereo receivers, etc.

The LM378 will deliver 4W/channel into 8 or 16 ohm loads. The amplifier is designed to operate with a minimum of external components and contains an internal bias regulator to bias each amplifier. Device overload protection consists of both internal current limit and thermal shutdown.

LM340

120-3094-32



BOTTOM VIEW

3-TERMINAL POSTIVE REGULATORS

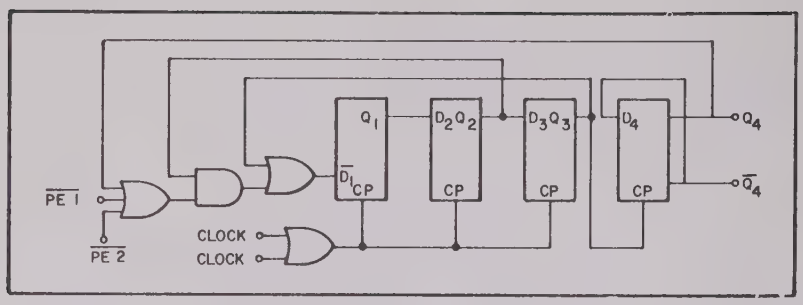
GENERAL DESCRIPTION

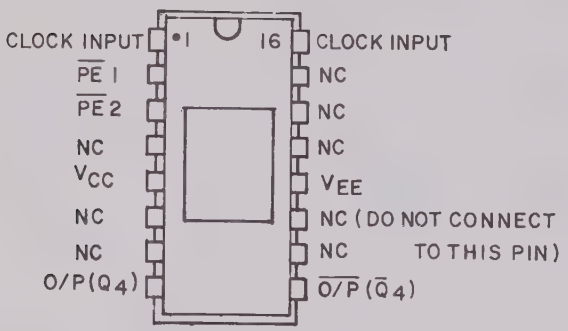
This series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. The regulators have $\pm 2\%$ V_{OUT} specification, 0.04%/V line regulation, and 0.01%/ma load regulation. When used as a zener diode/resistor combination replacement, the regulator usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow it to be used in logic systems, instrumentation, HI-FI, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

With adequate heat sinking the regulator can deliver 100ma output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistor is provided to limit internal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit takes over, preventing the IC from overheating.

SP8640B

120-4006-01





NOTE: UNUSED PINS (EXCEPT 8 AND 9) MAY BE CONNECTED TO V_{EE}. THIS WILL REDUCE CLOCK BREAKTHROUGH ON THE OUTPUTS. PINS 8 AND 9 SHOULD BE LEFT OPEN-CIRCUIT WHEN NOT IN USE PIN 11 IS INTERNALLY CONNECTED AND MUST ALWAYS BE LEFT OPEN-CIRCUIT.

UHF PROGRAMMABLE DIVIDERS ÷10/11

In frequency synthesis it is desirable to start programmable division at as high a frequency as possible, because this raises the comparison frequency and so improves the overall synthesizer performance.

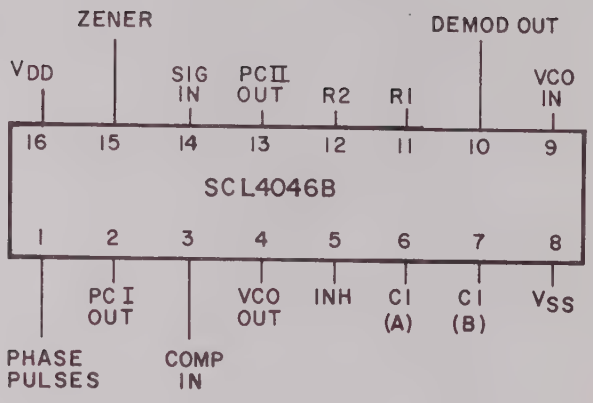
The SP8640 series are UHF integrated circuits that can be logically programmed to divide by either 10 or 11, with input frequencies up to 350MHz. The design of very fast fully programmable dividers is therefore greatly amplified by the use of these devices and makes them particularly useful in frequency synthesizers operating in the UHF band.

All inputs and outputs are ECL-compatible throughout the temperature range: the clock inputs and programming inputs are ECL III-compatible while the two complementary outputs are ECL II-compatible to reduce power consumption in the output stage. ECL III output compatibility can be achieved very simply, however.

The division ratio is controlled by two $\overline{PE}$ inputs. The counter will divide by 10 when either $\overline{PE}$ input is in the high state and by 11 when both inputs are in the low state. Both the $\overline{PE}$ inputs and the clock inputs have nominal 4.3K pulldown resistors to V_{EE} (negative rail).

SCL4046

120-6038-01



CMOS PHASE-LOCKED LOOPS

DESCRIPTION

The SCL4046B and SCL4446B phase-locked loops contain two phase comparators, a voltage-controlled oscillator (VCO), source follower, and zener diode. The comparators have two common inputs. The Signal input can be used directly coupled to large voltage signals, or indirectly coupled (with a series capacitor) to small voltage signals. The self-bias circuit adjusts small voltage signals in the linear region of the ampliifer. Phase comparator I (an exclusive-OR gate) provides a digital error signal PCI_{out}, and maintains 90^{o} phase shift at the center frequency between Signal and Comparator inputs (both at 50% duty cycle). Phase comparator II (with leading edge sensing logic) provides digital error signals $PCII_{out}$ and Phase Pulses, and maintains a 0^{o} phase shift between input signals (duty cycle is immaterial). The linear VCO produces an output signal VCO_{out} whose frequency is determined by the voltage of input VCO_{in} and the capacitor and resistors connected to pins $C1_{A}$, $C1_{B}$, R1, and R2. The source follower output, Demod Out, with an external resistor is used where the VCO_{in} signal is needed but no loading can be tolerated. The inhibit input Inh, when high, disables the VCO and source follower to minimize standby power consumption. The zener diode can be used to assist in power supply regulation.

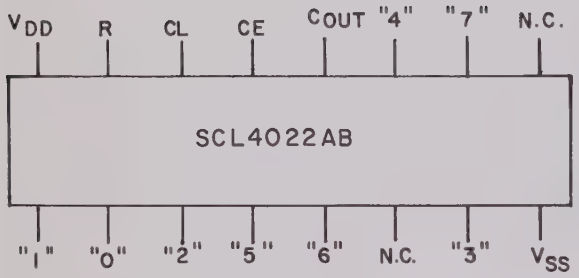
SCL4022AC+

120 6045-01

POSITIVE LOGIC

CLOCK	CLOCK ENABLE	RESET	OUTPUT = n
0	X	0	n
X	1	0	n
↓	0	0	n + 1
	X	0	n
1	↓	0	n + 1
X		0	n
X	X	1	"0"

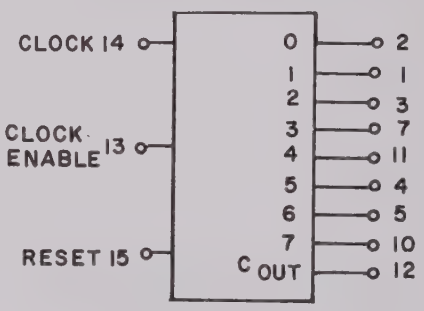
X DON'T CARE IF n < 4 CARRY = 1, OTHERWISE = 0



ADD SUFFIX FOR PACKAGE:

- C 16 PIN CERDIP
- D 16 PIN CERAMIC
- E 16 PIN EPOXY
- F 16 PIN FLAT
- H CHIP

BLOCK DIAGRAM



V_{DD} = PIN 16

V_{SS} = PIN 8

CMOS Octal Counter/Divider

DESCRIPTION

This device consists of a 4-stage Johnson Divide-by-8 Counter and an Output Decoder. Inputs include Clock, Reset, and Clock Enable signals.

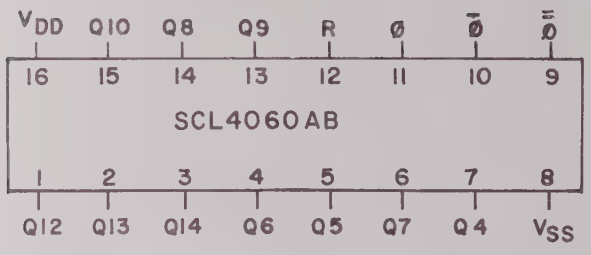
The counter has interchangeable Clock and Clock Enable lines for incrementing on either a positive-going or negative-going transition, respectively. A high Reset signal clears the counter to its zero count.

Use of the Johnson divide-by-eight counter configuration permits high-speed operation, 2-input decode gating, and spike-free decoded outputs. Anti-lock gating is provided, thus assuring proper counting sequence. The 8 decoded outputs are normally low and go high only at their respective decoded time slot. each decoded output remains high for one full clock cycle. A Carry-out (C_{OUT}) signal completes one cycle every 8 clock input cycles and is used to directly clock the succeeding counter in multi-stage applications.

This part can be used in frequency division circuits as well as octal counter or octal decode display applications.

SCL4060ABC

120-6055-01



TRUTH TABLE

CLOCK	RESET	OUTPUT STATE
⌐	0	NO CHANGE
¬	0	ADVANCE TO NEXT STATE
X	1	ALL OUTPUTS ARE LOW

X = DON'T CARE

DESCRIPTION

The SCL4060AB consists of an oscillator section and 14 ripple-carry binary counter stages. The oscillator configuration allows design of either R-C or crystal oscillator circuits. A Reset input is provided which resets the counter to the all-0's state. A high level on the Reset line accomplishes the reset function. The state of the counter is advanced one step in binary order on the negative transition of the Clock input Ø. All inputs and outputs are fully buffered. Outputs are available from stages 4 through 10 and 12 through 14.

CD40109

120-6062-00

COS/MOS QUAD LOW-TO-HIGH VOLTAGE LEVEL SHIFTER

High-Voltage Types (3 to 20-Volt Rating)

The CD40109B contains four low-to-high-voltage level-shifting circuits. Each circuit will shift a low-voltage digital-logic input signal (A,B,C,D) with logical 1 = V_{CC} and logical 0 = V_{SS} to a higher-voltage output signal (E,F,G,H) with logical 1 = V_{DD} and logical 0 = V_{SS}.

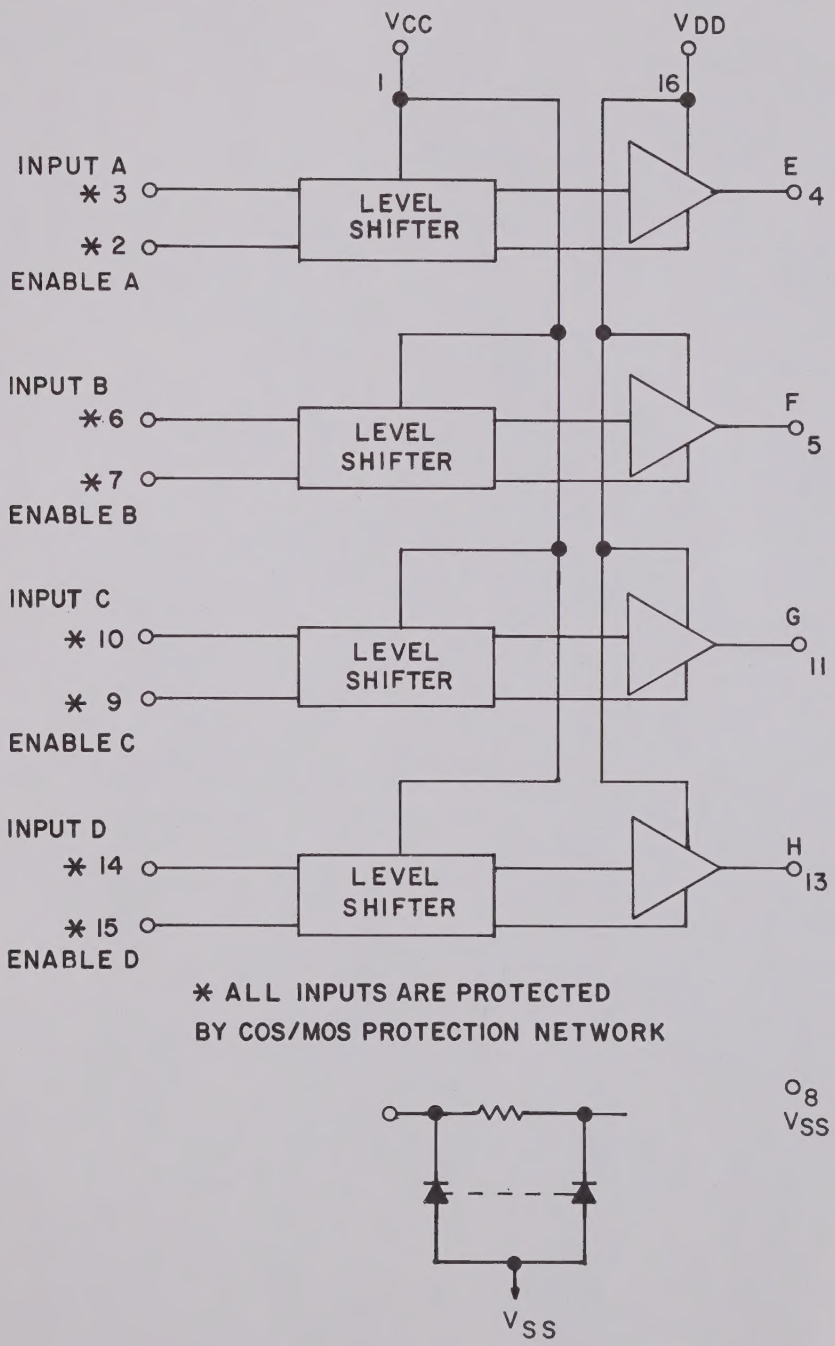
The CD40109, unlike other low-to-high level-shifting circuits, does not require the presence of the high-voltage supply (V_{DD}) before the application of either the low-voltage supply (V_{CC}) or the input signals. There are no restrictions on the sequence of application of V_{DD}, V_{CC}, or the input signals. In addition, there are no restrictions on the relative magnitudes of the supply voltages or input signals within the device maximum ratings; V_{CC} may exceed V_{DD}, and input signals may exceed V_{CC} and V_{DD}. When operated in the mode $V_{CC} > V_{DD}$, the CD40109 will operate as a high-to-low level-shifter.

The CD40109 also features individual three-stage output capability. A low level on any of the separately enabled three-state output controls produces a high-impedance state in the corresponding output.

The CD40109B-Series types are supplied in 16-lead ceramic dual-in-line packages (D,F, and Y suffixes), 16-lead dual-in-line plastic packages (E suffix), 16-lead ceramic flat packages (K suffix), and in chip form (H suffix).

CD40109

120-6062-00



T.E. Cal Lab

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